R.B.A.N.M'S H.S (M) LIBRARY
Blore-42
Accession No ; 723
U.D.C. No : 030-1 (Rov)
Date; 4.2.1981

M60

THE

NATIONAL CYCLOPÆDIA

OF

USEFUL KNOWLEDGE.

R.B.A N.M'S H.S (M) LIBRARY
B lore-42
Accession No: 723
U.D.C No: 030-1(LROV)M60
Date; 4-2-81

VOL. VI.

EVERDINGEN——HANOVER.

ROUTLEDGE, WARNE, & ROUTLEDGE,
FARRINGDON STREET.
NEW YORK: 56, WALKER STREET.
1860.

R.B.A.N.M'S H.S (M) LIBRARY
Bellary-42
Accession No: 723
U.D.C No: 030.1 (R.O.U)
Date: 4-2-1987
M60

E/R 885

THE

NATIONAL CYCLOPÆDIA

OF

USEFUL KNOWLEDGE.

EVERDINGEN, ALDERT VAN, a Dutch landscape painter and etcher, was born at Alkmaar in 1621. The wild and the rugged is the prevalent style of his landscapes, and chiefly from Norwegian scenery. He spent upwards of a year in Norway, and took the greatest delight in sketching the wild scenery of its rugged coast. Some of his forests are extremely true and picturesque, and he excelled also in figures and animals. He died at Alkmaar in 1675. Everdingen's etchings are numerous, but scarce; among them are a series of one hundred Norwegian landscapes, and a series of fifty-six original illustrations to the celebrated fable of 'Reynard the Fox:' his plates are generally marked A. V. E.

EVERGEM. [Flanders, East.]

EVERGREENS, in Horticulture, are plants which shed their old leaves in the spring or summer after the new foliage has been formed, and are verdant through all the winter season; of this nature are the holly, the laurel, the ilex, and many others. They form a considerable part of the shrubs commonly cultivated in gardens, and are beautiful at all seasons of the year.

The principal circumstances in which evergreens physiologically differ from other plants are the hardness of their cuticle, the thickness of the parenchyma of their leaves, and the small number of breathing pores formed on the surface of those organs. These peculiarities, taken together, enable them to withstand heat and drought with more success than other plants, but are often not sufficient to protect them against such influences in excess. Hence we find them comparatively uncommon on those parts of the continent of Europe where the summers are hot and dry, and most flourishing in a moist insular climate like our own. This is rendered more intelligible by a comparison of the proportions borne by their evaporating pores, or stomates, and those of deciduous plants. As far as this subject has been investigated, it appears that their leaves are usually altogether destitute of such organs on the upper side, and that those of the lower are mostly fewer in number and much less active than in deciduous plants.

The greater part of evergreens are raised from seed; some are propagated by cuttings or layers, and the variegated varieties by budding and grafting. The soil in which they succeed best differs with the kinds. American evergreens, such as rhododendrons, kalmias, &c., grow best in equal quantities of peat earth, sand, and vegetable mould. European sorts grow in their greatest vigour in a fresh hazelly loam, but will thrive in almost any kind of soil.

The operation of transplanting evergreens may be performed with success at almost all seasons of the year. Midsummer planting has even been recommended; it is however a work of necessity rather than propriety, because its success depends entirely upon the nature of the weather after the operation. If it be cloudy and wet for some time, it may succeed; but if, on the contrary, it be hot and dry, the plants will suffer: for this reason, if the practice may be adopted, it is not to be recommended. The common holly however has been often known to succeed when planted at this season, either for hedges or as single plants. The hollies, in one very remarkable case, were carefully dug up in the cool of the evening and removed to large trenches which had been prepared for their reception; a quantity of water was then poured upon the roots, and the soil thrown upon the top of it, which of course was carried down and deposited in all the crevices in the trench, rendering the plants perfectly firm. In the instance alluded to the weather was very favourable for a considerable period after the operation was performed.

Autumn and spring are much better seasons for work of this kind; the plants are not so liable to suffer from the intense heat of the sun, and are more likely to be benefited by dews and rains. But, according to the most experienced cultivators, the winter months (that is, from October to February) are decidedly the best for transplanting evergreens. Mr. McNab, who is one of the greatest authorities upon this subject, says — 'I have planted evergreens at all seasons of the year with nearly equal success, except from the middle of June to the middle of August, and even during this period I have planted some; but, unless the weather is very dull and moist, it is difficult to prevent the plants suffering considerably, and in many cases it is years before they recover. Although, however, I have planted evergreens ten months out of the twelve with little difference of

success, yet one season has a preference over the others with me, and when there is the power of choice I would recommend late in autumn, winter, or early in spring, that is, any time from the middle of October till the middle of February: and, in general, the beginning of this period is the best; that is, from the middle of October till the middle of December; always providing that the weather and the ground are favourable; that is, supposing there is no frost, no drying wind, nor much sunshine, and that the ground is not too much saturated with wet, either from continued rain or from the nature of the soil. One of the principal things to be attended to in planting evergreens is to fix on a dull day for winter planting, and a moist day for spring and autumn planting.'

It is of great importance to keep a number of the more tender sorts of evergreens in pots, in order to send them to a distance if required; and if they are to be transplanted at home their roots are not so liable to be injured as when they are dug from the ground. The more tender species of the following genera should be treated in this way:—Arbutus, Cupressus, Daphne, Erica, Juniperus, Laurus, Magnolia, Phyllirea, Pinus, Quercus, Rhamnus, Thuja, &c.

In lifting evergreens particular care should be taken of the young rootlets, as upon their preservation the success of the operation in a great measure depends; especially if the specimens have arrived at any unusual size. Small evergreens are planted like other things; but the following precautions should be observed in all cases where individuals of any great size are the subject of the operation.

When the plant has been lowered into the hole dug for its reception, the soil must be thrown in loosely around it (not trod in), and a basin made to hold a quantity of water, which must be filled several times until the whole is completely saturated; this will convey the particles of soil down to the roots of the plant, and render it much more firm than any other method. By this treatment we have seen plantations of evergreens formed without a single failure, which, when finished, appeared to have been growing for many years.

It matters little what size the plants have attained, if they can only be lifted without injuring the small fibres of the roots: they have been moved, from ten to twenty feet high and otherwise large in proportion, with complete success. Should, however, the roots be unavoidably injured in transplanting, the branches must be closely pruned and shortened in proportion; so that, when they begin to draw upon the roots for support, they may not require more nourishment than the latter can supply.

Considering the great importance of evergreens in a climate like that of Great Britain, where they flourish in such unrivalled beauty, and form so much natural protection to bleak, exposed situations, they cannot be too extensively planted.

EVERLASTING FLOWERS. This name is popularly given to certain plants whose flowers have the property of retaining their brightness and colour for many months after being gathered. They owe this quality to a hardness of their tissue, which has exceedingly little moisture to part with, and which, consequently, does not collapse or decay in the progress of acquiring perfect dryness. It is generally in the scales of the involucre of composite plants or in the bracts of others that this property resides.

EVESHAM. [Worcestershire.]

EVIDENCE. Legal evidence denotes the means by which facts are ascertained for judicial purposes. In the common law of England, where facts are ascertained by juries, the body of rules denominated the law of evidence has been gradually established within the last two centuries. It is a system of restrictions upon the admission of testimony, which seems to show that, in this country at least, the tendency has been to contract and not to enlarge the rules of judicial evidence. The accounts of our earlier judicial proceedings contained in the state trials sufficiently prove that it was the practice formerly to admit without scruple or question every species of testimony; whereas the present law of evidence is almost wholly composed of restrictive rules.

Evidence, in a legal sense, may be either oral or written, and is always given on oath, except in the case of Quakers and Moravians; but the form of the oath is immaterial. A Christian is sworn upon the Gospels; a Jew, upon the Old Testament; and a Mohammedan or other person not a Christian, in such form as he considers binding. [Oath.] All persons who have understanding enough to know the nature of an oath, and will take an oath, are admissible as witnesses.

There are however certain cases, and there were formerly more, in which a person was not admissible as a witness, either because he was a party interested in the proceedings, or because he had been convicted of some crime. But the Act 6 & 7 Vict. c. 85, declares that no person shall be excluded by reason of incapacity from crime or interest from giving evidence either in person or by deposition; with some provisions for particular cases.

It is a general rule that in a trial he who affirms a thing must prove it; and he must give the best evidence which the nature of the case admits; and, as a general rule, hearsay testimony is not admitted. But there are some exceptions to the last rule: as the declarations of persons who are in imminent danger and under the apprehension of immediate death; the declarations of deceased persons, and made against their interest, as, for instance, charging themselves with the receipt of money on account of third persons, or acknowledging the payment of money due to themselves; the declarations of deceased persons respecting rights of a public nature, such as the boundaries or general customs of a manor or district.

Written evidence consists of records, documents under seal, as charters and deeds, and writings not under seal. Acts of parliament are records of the highest nature, being the memorials of the legislature; but a distinction is made with respect to evidence between public and private statutes. A public statute requires no proof in courts of justice; but private acts must be proved by copies compared

with the original roll of parliament. A second and inferior species of records is the proceedings of courts of justice, which are proved by exemplifications, sworn copies, and office copies. Exemplifications are transcripts of the records of different courts, accredited by having the seals of such courts attached to them. Sworn copies are transcripts made by individuals who authenticate them upon oath, when they are produced in evidence. Office copies are copies certified to be true and accurate by an officer, expressly intrusted with that business, of the court to which the records belong. The reception of various certificates, official and public documents, is regulated by 8 and 9 Vict. c. 113. Charters and deeds are proved by the production of the instrument and proof of the execution by the party to be charged with it; but, where the document is more than thirty years old, the execution need not be proved. The general rule is that the original deed must be produced. Deeds attested must, in general, be proved by one at least of the subscribing witnesses; but if the attesting witnesses be dead, or cannot be found, the execution of the deed may be proved by proof of the hand-writing of the party. The testimony of persons skilled in hand-writing is wholly excluded. The course is, that a witness acquainted with the writing of the individual in question, and who has seen him write, or who has had a written correspondence with him, shall testify to his belief that the document to be proved is his hand-writing.

From the above summary of the principal rules of evidence existing in the English law, it will be observed that the system is extremely exclusive.

Witnesses in proceedings in equity are examined upon written interrogatories, as explained in the article EQUITY. The interrogatories are drawn by counsel, according to the instructions which he receives as to the facts which a witness is considered able to prove. The interrogatories which either party proposes to his witnesses are not known to the adverse party until the examination of all the witnesses on both sides is concluded, when *publication* is passed, as it is termed, and copies of all the depositions are delivered to the litigating parties under an order of the court.

Witnesses in courts of law are produced before the court, and examined by counsel; after which they may be cross-examined by the counsel for the other side. In the equity system there is of course no cross-examination, in the proper sense of the term; for one party does not know what the witnesses examined by the opposite party have deposed, and cannot therefore effectually examine them, as in a court of common law, where the cross-examination of a witness follows and is founded upon what the witness has stated in his examination in chief. If a party to a suit in chancery will cross-examine a witness who is produced by his adversary for examination, he must examine him on written interrogatories, without knowing what interrogatories have been proposed to him by the opposite party, and without knowing what he has said in his depositions in chief. Such a cross-examination must be in general altogether useless, and often dangerous to the interest of the party making it, unless the witness is one whom he would himself have examined in chief.

(See *Minutes of Evidence taken before the Chancery Commissioners, annexed to their Report of* 1826; and a pamphlet (1837) by W. A. Garrat, entitled *Suggestions for Reform in Proceedings in Chancery.*)

Those who may be inclined to follow this subject further will find it discussed at great length in Bentham's 'Rationale of Judicial Evidence,' a work which has certainly contributed to the formation of more correct opinions on evidence; but it has neither exhausted the subject, nor is it free from great defects. The rules of the English law of evidence are contained in the treatises of Mr. Phillipps and Mr. Starkie.

EVIL EYE. It was an ancient superstition that certain persons were endued with the power of injuring those on whom they cast a hostile or envious look. The eyes of such persons were supposed to dart noxious rays on every object on which they were fixed. This power of injuring with the eye was called *Bascania*, by the Greeks, and *Fascinatio* by the Romans.

It is remarkable that the same superstition prevails to the present day in several parts of the world, even in the northern part of our island, and in Ireland. The belief in fascination is extremely ancient, and in the opinion of some is connected with the story of Medusa and the Gorgons, whose eyes caused immediate destruction.

'Nothing,' says Dallaway, in his 'Account of Constantinople,' 4to., London 1797, p. 391, 'can exceed the superstition of the Turks respecting the Evil Eye of an enemy or infidel. Passages from the Koran are painted on the outside of the houses, globes of glass are suspended from the ceilings, and a part of the superfluous caparison of their horses is designed to attract attention, and divert sinister influence.'

(Brand's *Popular Antiquities.*)

EVO'DIA, a genus of plants belonging to the natural order *Rutaceæ*. The species are shrubs and trees, with a grateful smell. *E. febrifuga* is a tree, a native of the forests of the province of Minas Geraes in Brazil. The bark and young wood are bitter and astringent, and are employed by the medical practitioners of Brazil as a tonic and febrifuge. *E. hortensis* is a native of the Friendly Islands and the New Hebrides. *E. drupacea* is a native of New Caledonia. The two last are shrubs. All the species are worth cultivation on account of their agreeable scent.

EVOLUTION. [INVOLUTION AND EVOLUTION.]

EVOLUTIONS, MILITARY, are the movements made by any body of troops either acting by itself or in conjunction with other bodies, for the purpose of arriving at or of retiring from a field of battle, or of placing itself in a position to act offensively or defensively against an enemy.

Evolutions of a Battalion.—When a battalion formed in line has to march in that order towards the front or rear, three directing sergeants post themselves a little way in front of the centre of the line, and advance directly towards some object

in the front, the battalion following and keeping itself perpendicular to the line of march. While the battalion is thus moving in line, the two flank companies are wheeled backwards, and made to march in files perpendicularly to the line of the battalion, in order to cover it; and, on a halt being ordered, they face towards the enemy.

This order of march can of course only take place where the country is open; when obstacles occur frequently, it is evident that the march of the battalion should be in column.

Columns formed for this purpose are designated columns of companies, of subdivisions, and of sections, according as their breadths, or the extent of their front, is equal to that of a whole, a half, or any portion of a company; and they are said to be at open order, at half, or at quarter distance, according as the intervals between the companies or their divisions are equal to the whole, to one-half, or to one quarter of the breadth of the column. The order is said to be close when the several divisions are at the distance of one pace only from each other in the length of the column.

The wheel from line into column, and the converse, when the battalion is at a halt, must obviously be performed by causing the divisions to describe a quarter of a circle on their respective pivots. These wheelings may be made upon either extremity of a company or subdivision, and they may take place either forward or backward, according to circumstances; occasionally also a company is required to perform a wheel upon its centre, in which case one-half wheels backward, and the other half forward; but in all cases the wheeling pivots are to remain dressed, or in one line.

When a battalion is formed into a column for the purpose of an attack, it is called a column of manœuvre; and, when so formed, in order to move along a road or through a defile, a column of route. In either case the column may be in open order, at half, or at quarter distance, or in close order. In the last disposition it has the convenience of moving upon less space than the open column, with equal capacity of forming in any manner that may be required for resisting an attack.

The battalion in line may be formed into a single or double column: the former upon or in rear of either flank company, and the latter upon the two centre companies or the two centre subdivisions. For an attack, the column formed on the centre of a battalion can be more rapidly brought to bear upon the required point than a column formed on one of the wings, seeing that the divisions in line have but half the distance to march through in order to arrive at their places in the column, and a corresponding advantage is enjoyed when the battalion has to deploy from column into line.

A battalion in column at open order is formed in line by merely causing the divisions to wheel upon their respective pivots; but a close column of companies, having its head already in the alignement, is deployed by causing the several divisions to move out by files to the right or left, parallel to the alignement, and then marching up

to its place in the line. The deployment may take place upon any one of the companies, which then remains at rest.

Echelon movements are performed when it is required to advance or retreat obliquely, and when a change is to be made in the position of a line, corresponding to a wheel of the whole about some given point: the movements are made to the front when an enemy's flank is to be turned, and to the rear when it is required to cover the flank of the line itself. Echelon movements are the safest that can be adopted by troops in presence of the enemy, as they have the advantage of preserving a general front during the march.

An important evolution of a battalion is that of placing itself in a square or oblong form, with the men on the four sides facing outwards, so as to be enabled to resist an enemy who may attempt to surround them. This figure is always formed hollow, so as to inclose a space in which baggage or treasure may be placed for security; if otherwise, it is evident that great numbers of the men would be useless, since they could not use their fire-arms. If the square is to resist an attack of cavalry, it may be formed four deep, the two front ranks kneel and slope their firelocks outwards till, at the word of command, they fire a volley: the men in the two standing ranks fire by files, or independently of one another.

A battalion in column may be obliged to engage in a street or narrow pass where deployment is impossible. In this case, if the column is advancing, the two front companies or divisions fire, the first kneeling and the other standing; after which, on a favourable occasion presenting itself, the whole column moves forward: if the column is to retire, the first division, after firing, faces outwards, half to the right and half to the left; these subdivisions file away to the rear, where they reload; the second division fires, then files to the rear in like manner, and so on.

Evolutions of a Regiment of Cavalry.—The movements of cavalry on a field of battle, like those of infantry, consist of marches to the front or rear, in line or en echelon, deploying from open or close columns into line, and the converse.

To deploy in line to the front from a close column of squadrons for an attack, suppose on the second squadron; all the squadrons except this break into divisions by threes, as it is called (that is, into divisions consisting of three horses in each of the two lines); the divisions of the different squadrons wheel a quarter circle to the right or left, and march till they get opposite their respective places in the intended line, and into this all the squadrons now move. But if the line be required to be formed on the rear of the regiment when in retreat, for the purpose of defence, suppose on the fourth squadron, this squadron must then change its front by a counter-march, the others break into divisions, wheel a quarter circle, and march into the intended alignement, as before.

The reason why the squadrons are made to break into divisions by threes is that, since the breadth of three horses is about equal to the length of one, each division of three can wheel within a space equal to that which it occupies in line.

Evolutions of an Army.—The general principles upon which the evolutions of armies, divisions, or brigades, are performed, correspond nearly to those of single battalions. When a whole line has to advance parallel to itself, one of the battalions is considered as the regulator, and all the others should conform to its movements.

Columns of route or manœuvre are formed of any number of battalions, each in column of companies or of subdivisions, in rear of one another; and, if the columns are at close order, the interval between every two battalions is only six paces, or the same as if all the troops were drawn up in line. When one general column is required to form into what is called a line of columns, the heads of all the columns must be placed in one alignement; but the distances of the several columns from one another in the direction of the line may, according to circumstances, be of any extent, from six paces (in which case the columns are said to be contiguous), to the proper distance for deployment, that is, a distance equal to the length of a column.

When a column is on a march, the baggage should be in the rear; or if, on any account, it is placed within the line, it should be, together with the artillery which accompanies the column, in the intervals between brigades, and never between the battalions of a brigade.

Echelon movements of an army are almost always those which are made when in presence of the enemy, the inequalities of ground generally preventing large bodies of troops, if it were otherwise advisable to do so, from acting against one another in continuous lines. Oblique echelons of an army are formed by wheeling, and then marching in the new directions so as to gain ground obliquely towards a flank; each of the several bodies performing the manœuvre should not exceed a company, as it might be hazardous to present one flank of a large body towards an enemy in position, and thus expose the line to be enfiladed. When it is intended to refuse one wing, the battalions of that wing may retreat in echelon as far as necessary, and the artillery of that part of the line which is stationary should be ready to enfilade the enemy on his advance towards the retiring divisions. Movements of attack may be made in columns, which should deploy in line at from 1200 to 1400 paces from the enemy, the destructive effects of an enfilading fire preventing a nearer approach in column.

The retreat of a line is accomplished by causing each alternate battalion to retire, perpendicularly to the front, to a certain distance towards the rear, not exceeding 200 yards, that the divisions may be able to support each other by their fires; the remaining battalions protecting the retreat of the others, and then retiring as far as the intervals between the former battalions, who then retreat still further, and so on. The intervals in the lines should be occupied by light infantry; and, if the enemy should press closely, the second line of the army, after the first battalions have passed through it, must contribute by its fire to the defence of the intervals in the first line.

Manœuvres of Light Troops.—To the light infantry and riflemen, or troops acting as such, are intrusted the guard of the encampments or cantonments. When an army is on the march, they reconnoiter the country, repel any parties of the enemy which might get between the columns while advancing, and they check the pursuit of the enemy in a retreat.

When a battalion is employed as light infantry, not more than one-third of the men should actually engage as skirmishers; these extend themselves in line, in two ranks, to the right and left, from some given file, at any distance which may be appointed; or, if no order is given, at the regulated distance of six paces. The rest of the battalion is divided into parties, as supports, of which one is usually in rear of the centre, and another is towards each flank; and, when the skirmishers have advanced about one hundred paces to the front, these supports follow them, and are themselves followed by a general reserve. The skirmishers advance or retire, as the case may be, in one general line, and they should avoid standing exposed, if any cover, as that of a hedge, ditch, or copse, can be obtained on the ground: for this reason, when obliged to cross an open plain, their line should make a simultaneous rush towards the spots where they may fire under cover. On open ground, they fire kneeling or lying down, the front rank man discharging his piece first, then retiring in rear of the second rank, and loading: as soon as he has loaded he gives the word, 'ready,' in a low voice, when the second rank man fires and loads, care being taken that the muskets of both ranks are not unloaded at the same time.

On the appearance of cavalry the nearest supporters and the reserve move towards the threatened part, and form squares; the skirmishers at the same time run to any cover from whence they may aid the supports by a cross fire.

E'VORA, the principal town of the province of Alentejo, in Portugal, is built upon an eminence in the midst of a fertile country, about 80 miles S.E. from Lisbon, 50 W. by S. from Badajoz, and has about 12,000 inhabitants. Evora is an archbishop's see, has a college, several good buildings, and a fine aqueduct, attributed to Sertorius, who for a time made this town, then called Ebora, his residence. There is still at Evora a handsome Roman temple, which was not long ago, perhaps still is, used as a slaughter-house. The town has some manufactures of hats and leather, and a considerable inland trade.

EVRAN. [CÔTES-DU-NORD.]

EVREMOND, ST., *Charles de St. Denys, Seigneur de St. Evremond,* was born April 1, 1613, at St. Denys le Guast, near Coutances, in Normandy. He entered the army early, and by his literary talents and sprightly wit, as well as bravery, acquired the friendship of Turenne, Condé, and other of the most distinguished men of that brilliant epoch. Evremond's wit, however, was the cause of many mishaps. It offended Condé, and lost him promotion in the army; it offended Mazarin, and placed him in the Bastille; it offended Louis XIV., and to avoid his resentment St. Evremond fled to England. Here he became a favourite with Charles

II., who gave him a pension of 300*l.*, and his society was courted by the most distinguished wits and beauties of that reign; nor was he less fortunate in possessing the regard of William III., who had known him in Holland, and took much pleasure in his company. St. Evremond died in his 91st year, September 20, 1703.

St. Evremond's treatises on Roman literature and on the modern drama are ranked among his best works. His letters are among the most brilliant specimens of that style of composition in which the French have excelled. The first correct edition is that of Des Maizeaux, 3 vols. 4to., London, 1705, with a life prefixed. Des Maizeaux also translated the whole into English.

ÉVREUX, an ancient episcopal city in France, the capital of the department of Eure, stands in a pretty valley shut in by hills on the north and south, and watered by the Iton, which flows through the town in three branches, on its way to the Eure. It is situated in 49° 1½′ N. lat., 1° 9′ E. long., at a distance of 60 miles W. from Paris, and has 11,706 inhabitants. This town, or Vieil-Évreux, a village near it, occcupies the site of the ancient *Mediolanum*, which afterwards took the name of *Eburovices* from the people whose capital it was; and from this the modern name is derived. The streets of Évreux are broad and neat; the houses are mostly built of wood and plaster. The cathedral, part of which dates from the 11th century, is a very imposing structure, though it is not uniform in style. The north transept and the portal leading to it are in the florid Gothic, and are greatly admired; the west front is in the Italian style; the interior is lighted through many beautiful painted glass windows. The abbey church of St. Taurin, built by Richard II., duke of Normandy, also presents specimens of different styles, introduced in the various repairs it has undergone: it contains the shrine of St. Taurin, executed in the 13th century. Other remarkable objects are—the clock-tower, the public library, the botanical garden, the prefect's residence, the bishop's palace, the prison, the park, and the promenades in the neighbourhood, which is prettily laid out in gardens, vineyards, and meadows. The magnificent Château-de-Navarre, near the town, which was the residence of the young Pretender previous to 1745, and of the Empress Josephine after her divorce from Napoleon, was demolished in 1836, its plantations cut down, its streams turned to drive machinery, and its grounds brought into profitable cultivation. The town has tribunals of first instance and of commerce, two ecclesiastical schools, a college, primary normal school, savings' bank, &c. The manufactures are ticking, hosiery, woollen stuffs, vinegar, cotton yarn, leather, &c.; and the commerce of the town is composed of these articles, and of corn, brandy, cider, perry, linseed-oil, linen, hides, and groceries. A branch railroad is making from Évreux, to join the Paris and Rouen line. (*Dictionnaire de la France.*)

EVRON. [MAYENNE.]

EX. [DEVONSHIRE.]

EXAMINATION. [EVIDENCE.]

EXANTHE'MATA (*Exanthematous diseases*, from ἐξάνθημα, an *efflorescence*), a term under which are comprehended the eruptive fevers, or the diseases commonly termed *Rashes*. Rashes are superficial red patches, variously figured, and diffused irregularly over the body, leaving interstices of a natural colour, and terminating in cuticular exfoliations. Fever is an essential element in the definition of an exanthematous disease, as this term is usually employed by nosologists; but the writers on cutaneous diseases give to it a modified signification, and comprehend under it only those diseases which are properly termed rashes, whether those rashes are attended with fever, and whether they are contagious or not. Thus Dr. Bateman under the order *Exanthemata* comprehends measles, scarlet fever, nettle-rash, roseola or the rose, purpura, and erythéma.

EXARCH was the title of the governor of Italy under the Byzantine emperors, established by Justinian after the reconquest of Italy from the Goths in the sixth century. The residence of the exarch was at Ravenna. In A.D. 752, Ravenna being taken by Astolphus, king of the Longobards, the exarchate, as well as the dominion of the Byzantines over North Italy, was at an end.

EXCÆCA'RIA, a genus of plants belonging to the natural order *Euphorbiaceæ*. *E. agallocha* is a small crooked stunted tree, the trunk of which abounds in a virulently acrid milk, which acts as a powerful poison. Roxburgh says that wood-cutters who accidentally injure this tree have inflammations and ulcerations on those parts of the body where the milk touches. Rumphius calls this tree *Arbor excæcans*, and says that the Dutch sailors who were sent ashore at Amboyna to cut down timber became furiously mad from the pain produced by the juice of this tree getting into their eyes, and that some of them lost their sight altogether. This tree is common on various parts of the continent of India, and in the Indian islands, especially near the coast. Its specific name appears to have been given it on the supposition that it was one of the plants that yielded the Agallochum, or Aloes-wood; but this is not the case, and this wood is yielded by a different family of plants.

EXCENTRIC, or ECCENTRIC, in machinery, a kind of wheel in which the axis or centre of motion does not coincide with the geometrical centre, or in which the periphery is not circular. Eccentrics form an important class of mechanical expedients for converting one kind of motion into another. They also furnish means for producing, from the uniform speed of one revolving shaft, rotatory motion of continually varying speed in shafts placed in connection with it.

EXCENTRIC WHEELS. [WHEELS.]

EXCENTRICITY, a term applied to the ratio which the distance between the centre and focus of an ellipse or hyperbola bears to the semi-axis. With regard to this word, it should be noted that in the older writings on conic sections it was not the *ratio* of these two lines, but the former of them, namely, the distance between the centre and focus, which was called the eccentricity.

EXCHANGE. The term exchange is com-

monly employed by merchants to designate—first, the written instrument by which the debts of persons residing in different countries, or in different parts of the same country, are brought to a condition for final liquidation; and, second, the varying price of such negotiable instruments in the market. The first division of the subject is discussed under the title BILL OF EXCHANGE.

In investigating that part of the subject which belongs to the present article, it is necessary to bear in mind that different countries make use of different coins, different in denomination and in weight, and consequently in value. The pound, for instance, is the money of England, the franc that of France, the dollar that of America. These several coins contain very different quantities of the precious metals. The dollar, for instance, contains about five times as much silver as the franc, whilst the guilder contains only twice as much. The value of a currency depends on the quantity of pure metal contained in the coin which forms its legal tender, alloy being left wholly out of the account.

In the language made use of by merchants, the existence of a *par of exchange* is usually assumed. Between two countries making use of the same metal a par may exist, but between two countries one of which makes use of gold and the other of silver an invariable par cannot exist.

Gold is the standard in England. The silver coin of England possesses a conventional value independent of the market value, and the latter may fluctuate without affecting the former. Foreign coins, the franc or the guilder for instance, possess no such conventional value. They are merely a commodity liable to fluctuation with the varying price of silver. Within the last ten years the price of silver in the London market has varied from 4*s.* 10½*d.* to 5*s.* 1*d.* per ounce of 444 grains pure, the medium price being 4*s.* 11⅞*d.* to 5*s.* The extreme prices give the following results:—

Price of Silver per oz.		Value of Franc.	Value of £1.
s.	*d.*	*d.*	*f.*
4	10½	9⅛	26.30
5	1.	9.54	25.15

Thus making a fluctuation in the so-called par of exchange of rather more than 4½ per cent.

Though there exists no invariable par of exchange, it is extremely useful to the merchant to know the average value of the currency of every country with which he trades, in order to ascertain what may be called the *approximate par*, which must be the pivot around which fluctuations will necessarily turn. This approximate par should be grounded on the average value of a currency taken on a period sufficiently long to include fluctuations from highest to lowest. To the approximate par so taken will be the tendency of the rate of exchange to conform.

The approximate par of exchange will be liable to be affected by four circumstances, in addition to a rise and fall in the price of the precious metals. These are—

1. Changes made by the supreme authority in the quantity of pure metal contained in the coin by way of increase or diminution.

2. Depreciation from the use of paper money, and restoration.

3. Clipping, and restoration.

4. Wear and tear, and restoration.

Fluctuations in the rate of exchange proceeding from an alteration in the value of the medium in which price is quoted are purely *nominal*, and so they are usually designated. What is usually called the *real* exchange is the actual market-price, determined by the same law as the price of sugar, corn, or broad-cloth; namely, the existing proportion between supply and demand. The demand for bills of exchange arises out of the necessity of paying for importations. The supply arises out of the practice of drawing for the amount of exportations. If the supply and demand be equal—if for every pound's worth of goods imported there be exactly a pound's worth of exported goods to be drawn for—there will be no real exchange: that is, the real exchange, however much the nominal exchange may alter, will be at par. When however the importations are not precisely equal to the exportations, exchange can no longer remain at par. An excess of importation would cause exchange to advance against the importing country. The real exchange however is subject to a limit beyond which it cannot advance. This limit is the cost of transmitting the precious metals. The tendency in an advance in the rate is to check importation and stimulate exportation. Articles which would only just pay with exchange at par would pay a profit sufficient to induce exportation where the exporter could secure 1 or 2 per cent. more for his draft. Thus, by the stimulus to exportation, the supply of bills would be increased to meet the demand, and so far to check the advancing rate of exchange. On the other hand, an imported article, which was only just paying when exchange was at par, would cease to pay when it should cost the importer 2 per cent. more to make his remittance. Thus, whilst the cost of exporting the precious metals is the immediate check upon an advancing rate of exchange, the effect of the real exchange in stimulating or checking importation or exportation, as the case may be, is to work its own remedy. The real exchange is, in fact, continually gravitating towards par, though at times superior forces may overcome that perpetual tendency.

(Mill's *Elements of Political Economy;* Ricardo's *Principles;* Tooke's *High and Low Prices.*

EXCHANGE, BILL OF. [BILL OF EXCHANGE.]

EXCHEQUER BILLS form the principal part of the unfunded debt of this country. These bills are issued under the authority of parliament for sums varying from 100*l.* to 1000*l.*, and bear interest. They were first issued in the reign of William III.; and although their amount has since varied greatly at different times, the convenience which they afford to individuals, and their advantage to the public, have been such as to cause their constant issue. Their convenience to individuals arises from the circumstance of their passing from hand to hand without the necessity of making a formal transfer, of their bearing interest, and of their not being subject to such violent

fluctuations as sometimes occur in the prices of the funded debt. This comparative steadiness in value is caused by the option periodically given to the holders to be paid their amount at par, or to exchange them for new bills to which the same advantage is extended; besides this, when a certain limited period has elapsed from the date of their first issue, they may be paid to the government at par in discharge of duties and taxes. The amount of premium that may have been paid at the time of purchase is consequently all that the holder of an exchequer bill risks in return for the interest which accrues during the time that it remains in his possession. The advantage to the public consists in the lower rate of interest which they carry compared with the permanent or funded debt of the nation, to which however they must in this respect bear some certain proportion. When the price of the public funds is high, the interest upon exchequer bills will be low; and if, through any public or commercial derangement, the funds should fall in price so as to afford a much more profitable investment than exchequer bills, the rate of interest upon these must be raised in order to prevent their payment into the exchequer in discharge of duties, a thing which would embarrass the financial operations of government.

The present rate (Sept. 19, 1848) of interest upon exchequer bills is $2\frac{1}{2}d.$ per cent. per diem.

EXCHEQUER CHAMBER. [EXCHEQUER-COURT.]

EXCHEQUER COURT is a superior court of record established by William the Conqueror as part of the Aula Regis.

It is the lowest in rank of the four great courts of law which sit at Westminster Hall, although in ancient times one of the first in importance, as all causes relating to the rights of the crown were there heard and determined, and the revenues of the crown were supposed to be received there.

The Latinised form of the word Exchequer is *Scaccarium*. Camden says it was so called from the covering of the table at which the barons sat being parti-coloured or *chequered*, and on which, when certain of the king's accounts were made up, the sums were marked and scored with counters.

The judges of the court of exchequer are the chancellor of the exchequer for the time being, the chief baron, and four other barons, who are created by letters patent, and are so called from their having been formerly chosen from such as were barons of the kingdom, or parliamentary barons.

The Court of Exchequer now consists of two divisions, one of which exercises jurisdiction in all cases relating to the customs and excise, and over revenue matters generally. The other division is a court of common-law, in which all personal actions may be brought. The exchequer court of equity was abolished by 5 Vict. c. 5.

The number of officers on the plea side of the Court of Exchequer and their several duties were regulated by 2 & 3 Wm. IV. c. 110. The 3 & 4 Wm. IV. c. 99, abolished various offices in this court. By 5 & 6 Vict. c. 86, certain officers on the revenue side of the court were abolished, and the office of remembrancer of the court was regulated.

An appeal lies from this court by writ of error to the justices of the courts of king's bench and common pleas sitting in the exchequer chamber, who alone have power to review the judgments of the barons: and from their decision a further appeal may be brought before the House of Lords.

The Court of Exchequer Chamber was first erected in England by Stat. 31 Edward III., to determine causes upon writs of error from the common-law side of the Court of Exchequer. The judges of the three superior courts occasionally sit here to hear arguments in important criminal cases, and upon causes of great weight and difficulty, in which the judges of the courts below have not given their judgment.

As a court of error, the Court of Exchequer Chamber underwent considerable alterations by the passing of the 11th Geo. IV. and 1st Wm. IV. c. 70, and its constitution is now regulated by the latter statute.

The Court of Exchequer in Scotland was established by the 6th Anne, c. 26. This court was abolished in 1832 by 2 & 3 Wm. IV. c. 54. The judges were the high treasurer of Great Britain, with a chief baron, and four other barons.

The Court of Exchequer in Ireland was established by the 40th Geo. III. c. 39, and consists of the chief justices, chief baron, and the rest of the justices and barons, or any nine of them.

EXCISE DUTIES, the name given to taxes or duties levied upon articles of consumption which are produced within the kingdom. There are however certain duties to which the name of excise is applied which can hardly be called duties upon consumption, such as the sums charged for licences to permit persons to carry on certain trades, the post-horse duties, and the duty on sales by auction abolished in 1845.

Excise duties are said to have had their origin in this country in the reign of Charles I., when a tax was laid upon beer, cider, and perry, of home production, by the Long Parliament in 1643. This act contains also a list of foreign articles upon which excise duties were imposed in addition to duties of customs already chargeable. This act was adopted and enforced under the protectorate of Oliver Cromwell; and by the Statute 12 Charles II. c. 24, the duties of excise were granted to the crown as part of its revenue.

In every highly taxed country, where consumption duties form part of the public revenue, it would seem to be hardly possible to avoid the adoption of this class of duties. In England a drawback is allowed on the exportation of domestic articles which are subject to excise duty.

Excise duties are liable to this among other very serious objections, that the regulations under which they are collected interfere with processes of manufacture, so as to prevent the adoption of improvements. Upon the same premises, with the same capital and the same amount of labour, double the quantity of cloths has been printed which could have been printed previous to the repeal of the duty and the consequent abolition of the excise regulations. The abolition of the ex-

cise duty on glass in 1845 was made with the object of facilitating improvements in the manufacture. The excise regulations respecting the manufacture of soap have prevented our soap manufacturers from entering into competition with the manufacturers of other countries. Another great objection to excise duties is, the facilities which they offer for the commission of frauds against the revenue.

In 1797 the number of articles subject to excise duties was 28; 15 in 1833; 10 in 1835; and in 1845 there were only 9, including sugar. The post-horse duty is under the management of the Board of Excise, and in Ireland the duty on game certificates. The eight following articles are still subject to these duties, and with sugar made here constitute all the articles on which the excise duty is now collected :—Bricks, Hops, Licences, Malt, Paper, Soap, British Spirits, Vinegar.

In 1822 the excise duties yielded for the United Kingdom more than twice as much as the customs duties. In 1821 the excise duties reached to 27,400,300*l.*, which is the highest sum they ever attained. In 1845 they were again reduced to the amount at which they stood in 1797, a little above 11,000,000*l.*

In 1835 the number of traders in the United Kingdom who were surveyed periodically by excise officers was 588,000. The cost of these surveys in England alone amounted to 533,902*l.*; but since 1835 several of these surveys have been abolished.

The gross receipt collected by the excise on each article of duty in 1844 was as follows :—

	England.	Scotland.	Ireland.
Auctions	£275,177	£20,025	13 ,427
Bricks	435,336	11,379	
Glass	785,869	54,714	6,575
Hops	245,668		
Licences	835,430	105,460	95,504
Malt	4,285,887	546,345	161,003
Paper	542,907	135,649	30,762
Post-horse duty	146,195	16,966	
Post-horse licences	4,166	357	55
Soap	1,092,690	97,962	
Spirits	2,694,049	1,533,028	1,014,505
Sugar	6,867		93
Vinegar	17,805	127	269
Total	11,368,046	2,522,012	1,313,768*

The gross receipt, charges of management, and the rate per cent. for which the gross revenue of excise was collected in 1844, were as follows :—

	Great Britain. £	s.	d.	Ireland. £	s.	d.
Gross Receipt	13,905,022	0	0	1,339,394	0	0
Repayments, Allowances, Drawbacks, &c.	773,468	0	0	1,612	0	0
Charges of Collection	809,038	0	0	166,671	0	0
Rate per cent. of charges of collection	5	16	4¼	12	8	10½
Paid into the Exchequer	12,160,111	0	0	1,402,986	0	0

Prior to 1823 there were separate and independent Boards of Excise for England, Scotland, and Ireland, and the total number of the excise commissioners was twenty-one. The business is now better conducted by seven commissioners and by one board in London. The chairman has a salary of 2000*l.*, the deputy chairman 1500*l.*, and each of the other commissioners 1500*l.* a year. The commissioners hold courts and decide summarily in case of the infraction of the excise laws. The number of persons employed at the chief excise-office in London is about five hundred. In 1797 the number of officers belonging to the department in England was 4777, and their salaries amounted to 323,671*l.*; in 1815 the number of officers was 7986, and their salaries 904,922*l.*; and in 1835 there were 4190 officers, and their salaries amounted to 518,620*l.*

For the management of the business of the excise department the whole of the United Kingdom is divided into collections, and these are subdivided into districts, rides, and divisions. There are fifty-five collections in England and Wales, exclusive of the London collection, and at the head of each is a collector, who visits the principal towns in his circuit eight times a year to receive the duties and transact other business connected with the department; besides which he is required to have an eye generally upon the discipline and efficiency of the service. The number of officers in a collection varies from forty to ninety. The next subdivision of a collection is the district, at the head of which is a supervisor. Next come the subdivisions of the districts into rides and divisions, or foot-walks. Where the traders are scattered, the officer is obliged to keep a horse, and his circuit is called a ride; but, if a larger number of traders reside in a smaller circuit, they are visited by the officer on foot, and then the subdivision is termed a division, or foot-walk. Before going out each day, the officer leaves a memorandum at his home which states the places he intends to survey, and the order in which he will visit them; and the exact time at which he commences each must be entered in his journal. The supervisor resurveys some of the officer's surveys, but which they will be the officer is of course ignorant; and if errors are discovered they must be entered in the supervisor's diary. These diaries are transmitted to the chief office every two months, and no officer is promoted unless the diaries show him to be efficient. The periodical removal of officers from one part of the country to another was Mr. Pitt's suggestion, and is still acted upon: about 1100 officers change their residence yearly. At the chief office in London there is a department of Surveying-General Examiners, who are despatched to any district without previous intimation, as a check upon the accuracy and integrity of the supervisors. Promotions take place in the excise department after a certain fixed period in each grade, and only then when the officer petitions for advancement. This involves a rigid examination into his qualifications, which is termed 'taking out a character.'

* This sum includes 11,575*l.* on account of game certificates.

EXCITANTS. [Stimulants.]

EXCOMMUNICATION is the highest ecclesiastical censure which can be pronounced by a spiritual judge. The person against whom it is pronounced is for the time excluded from the communion of the church.

By a sentence of excommunication, both greater and less, the excommunicated were excluded from the right of Christian burial, from bringing or maintaining actions, from becoming attorneys or jurymen, and were rendered incapable of becoming witnesses in any cause. But, since the 53 Geo. III. c. 127 (54 Geo. III. c. 68, for Ireland), excommunication cannot now be pronounced in England or Ireland, except in certain cases (as spiritual censures for offences of ecclesiastical cognizance); and by the 3rd section of that statute 'no person who shall be pronounced or declared excommunicate (pursuant to the second clause of this statute) shall incur any civil penalty or incapacity, in consequence of such excommunication, save such imprisonment, not exceeding six months, as the court pronouncing or declaring such person excommunicate shall direct.' The proceedings in those cases, in which excommunication may still be pronounced, are the same, as to the issuing and return of the writ, as they were before the act of 53 George III.

EXCRETION. [SECRETION.]

EXECUTION is the effect given to the judgments and other proceedings analogous to judgments of courts of law in civil suits. This term denotes the process by which a party is put into the possession of that to which the judgment of a competent court declares him to be entitled. Accordingly the judgment is given either to put a party in possession of the thing in dispute, or to enable him to obtain pecuniary compensation.

For this purpose a written command issues in the name of the king or other lord of the court, to an officer of the court. When the judgment is in one of the king's superior courts at Westminster, the officer of the court for this purpose is the sheriff of the county in which the property is situated, or, in the case of pecuniary compensation, the sheriff of the county in which the party from whom such compensation is due is supposed to reside.

If a right to a freehold interest has been established, the writ commands the sheriff to give the recoverer *seisin* of the lands, &c., and is called *Habere facias seisinam*. If a chattel interest in land is recovered, the writ directs that officer to give possession of the land, &c. This is called *Habere facias possessionem*.

A judgment in the action of Detinue establishes the right of the recoverer to the possession of a specific personal chattel, and the writ of execution called a *Distringas ad deliberandum* issues, which requires the sheriff to coerce the defendant by his *distringas* (distress) to restore the specific chattel or its value.

A judgment for the defendant in Replevin establishes his right to the possession of the personal chattel which formed the subject of the litigation, as in the ordinary case of an action of replevin after a distress. The writ of execution requires the sheriff to cause the chattel to be restored to the possession of the defendant. This is called a writ *De retorno habendo*, and, in case the sheriff is unable to find the chattel, further process issues commanding him to take other chattels of the plaintiff as a substitute for that which is withheld, by a writ called a *Capias in withernam*.

The most ordinary cases of execution are those in which pecuniary compensation is to be obtained; but in these cases the sheriff is not authorised directly to take money from the party by whom it is to be paid. Formerly the only mode of obtaining this compensation was by process of *distringas*, or distress. And this is still the case in inferior courts; but in the superior courts execution of judgments or other records which establish pecuniary claims may be had by a writ of *Fieri facias*, which affects the personal property; by writ of *Elegit*, which affects both real and personal property; and by *Capias ad satisfaciendum*, by which compliance with the pecuniary demand is enforced by detention of the person of the defaulter in prison until the claim be satisfied, or the adverse party consents to his discharge.

A subject is not entitled to pursue all these remedies at once; but, in the case of the crown, the right to obtain satisfaction from the goods, lands, and person of its debtor may be enforced, simultaneously, by writ of *Capias*, and *Extendi facias*, or *Extent*.

Execution is also the term applied to denote the giving effect to the sentence of a court of criminal jurisdiction. In this sense it is most commonly used with reference to the execution of sentence of death.

EXECUTOR. An executor is he to whom another man commits the execution of his testament. The origin of executors seems to be traceable to a constitution of Manuel Comnenus (*περὶ διοικητῶν τῶν διαθηκῶν*). All persons who are capable of making a will, and some other besides, as married women and infants, are capable of being made executors; but infants are incapable of acting in the execution of the will until they attain the age of twenty-one.

An executor derives his office from a testament alone. If no executor is appointed by the will, administration is granted by the ordinary, with the will annexed, and the administrator is bound to obey the directions of the will. An executor may decline to act; but, having once acted, he cannot divest himself of the office or its liabilities; nor can an administrator who has accepted the office get rid of his responsibility.

The first business of an executor is to prove the will, which is done before the proper ecclesiastical court, which furnishes him with a probate, or approved copy of the will, which is his authority for acting. The original will is deposited in the registry of the court. An executor may do many acts in execution of the will before probate, as paying and receiving debts, &c., but he cannot, before probate, sustain actions or suits. An administrator can do nothing till the letters of administration are issued. If an executor die before probate, administration must be taken out to his testator, with the will annexed; but, if an executor die after having proved the will, his executor will be the executor and representative of the first testator, unless, before proving the will of the second testator, he renounces the execution of the will of the first. If the executor dies intestate, his

administrator is not the representative of the testator, but an administrator *de bonis non*, as it is termed, of the testator, must be appointed by the ordinary. If there are several executors, the office survives, and is transmitted ultimately to the executor of the surviving executor, unless he dies intestate. Executors have a joint and entire interest in the effects of their testator; any one of them is capable of acting by himself; and the receipt of a debt, or the transfer of property by one, is as valid as if it had been done by all.

If a stranger acts as executor without authority, he is called an executor *de son tort* (of his own wrong), and has all the liabilities of an executor without the advantage. But the only advantage which an executor derives from his office is the right to retain any debt due to him from the testator, as against creditors of equal degree.

The duties of executors and administrators are in general the same—to bury the deceased, to prove his will (which of course only an executor has to do), to get in his goods and chattels, to pay his debts in the order appointed by law, and also his legacies, if he has bequeathed any, and to dispose of the residue of his goods and chattels in the manner directed by the will, or according to the statutes for the distribution of the effects of intestates, if there should be a total or partial intestacy. Executors and administrators are liable to an action at law, and also to a suit in equity, for the payment of the debts and liabilities of their testator or intestate; and to a suit in equity and the ecclesiastical court for the legacies bequeathed by him, and the due administration of his estate: but no action at law lies for a legacy until after the executor has acknowledged the sufficiency of the assets after providing for the payment of the debts.

The ecclesiastical courts are the only courts in which, except by special prescription, the validity of wills of personalty can be established or disputed. If all the goods of the deceased lie in the diocese or jurisdiction within which he died, the will is proved before the bishop or ordinary of that diocese or jurisdiction; but, if he had *bona notabilia* (that is, goods and chattels to the amount of 5*l.*) within some other diocese or jurisdiction than that in which he died, then the will must be proved before the archbishop or metropolitan of the province by special prerogative; and, if there be *bona notabilia* in different provinces, there must be two prerogative probates. A will should be proved within six months after the death of the testator, or within two months after the termination of any dispute respecting the probate. (55 Geo. III. c. 184, sec. 57.)

Formerly, the personal estates only of persons deceased were liable for the payment of their simple contract debts; but now, since the Statute 3 & 4 Wm. IV. c. 104, real estate is liable for the payment of debts of that nature. The personal estate is liable in the first instance, unless the testator direct otherwise. Estates descended are applied before estates devised; and in other respects the estates of the deceased are administered in the order laid down by the courts.

Full information upon these subjects will be found in the work of Williams *On Executors*.

EXE'DRA (ἐξέδρα), a name given to certain open recesses in the buildings of the ancients. There were exedræ in the baths. Vitruvius says the spacious exedræ of the Greek palæstra were furnished with seats.

EXERCISE. [ANALEPTICS.]

EXETER, a city and a county of a city, parliamentary borough, municipal borough, and the capital of Devonshire, is 44 miles N.E. from Plymouth, 174 miles W. by S. from London by the road, and 193 by the Great Western Railway.

Exeter is supposed to have been a settlement of the Britons before the Roman invasion. By the Romans it was called Isca Damnoniorum, to distinguish it from the Isca Silurum in Wales. From the number of coins, small bronze statues, tesselated pavements, and other Roman antiquities discovered near the walls and in the neighbourhood of the city, it must have been a Roman station of some importance. In the reign of Alfred, the town had acquired the name of Ex-an-Cestre (castle on the Ex), whence its present name.

Exeter is situated on a steep acclivity on the north-eastern bank of the river Ex, over which is a handsome stone bridge, leading to the suburb of St. Thomas. The streets, with the exception of the High Street and Fore Street, are generally narrow, but there are some handsome squares and terraces, which contain many well-built houses. There are many ancient timber houses, and some modern houses of the same style of building. The town is well supplied with water by water-works.

The city of Exeter was formerly strongly fortified, and much of the exterior wall in a ruinous state still remains: a part of the rampart has been converted into a public walk. The city, exclusive of the suburbs, is a mile and a half in circumference. Situated on a high eminence, on the north side of the town, are the ruins of the castle, called Rougemont. It was either rebuilt or repaired by William the Conqueror. It continued to be an important fortress till it was completely dismantled during the civil war. In the area of the castle-yard a session-house has been erected, a neat-looking building faced with Portland stone, which contains, in addition to two courts, a grand jury-room, magistrates' room, &c. In front is a fine open space, where county, election, and other meetings are held. Nearly in the centre of Exeter is the guildhall, where the assizes for the city are held, as well as the sessions, elections, &c. It is uncertain when Exeter Cathedral was first built, but probably it was soon after the see of Devon was transferred to Exeter from Crediton, in 1049. It was considerably altered and enlarged by Warlewast, third bishop of Exeter, who was a Norman, and came over with the Conqueror. It then assumed its present cruciform shape, but underwent numerous alterations and additions during the thirteenth and fourteenth centuries. It now consists of a nave, 76 feet in width and 175 in length, with aisles; two short transepts, formed by two Norman towers 130 feet in height; a choir of the same width as the nave, and 128 feet in length; ten chapels or oratories, and a chapter-house. The whole building from east to west (including St. Mary's Chapel) is 408

feet in length. The western front is highly decorated with a profusion of niches and carved figures, and presents an exceedingly rich façade. The towers are highly interesting specimens of Norman architecture. The interior is also exceedingly fine; the vaulted roof of the nave is supported by clustered columns, surmounted by pointed arches, as is also that of the choir, which is separated from the nave by a screen of beautiful workmanship. The chapter-house is a fine edifice, with a handsome oak roof.

Exeter comprises 19 parishes, besides two or three extra parochial places, and has therefore many parish churches, as well as several places of worship for dissenters. The Devon and Exeter Hospital is supported by subscription, and has also a considerable income arising from funded property. There is a lunatic asylum, a dispensary, an eye infirmary, an institution for the deaf and dumb, a savings' bank, and a mechanics' institution. The workhouse forms a large range of buildings in the London road; it contains a governor's house, committee rooms, &c., and affords accommodation to several hundreds of the poor. There is a free grammar-school which was founded by the citizens in the reign of Charles I.; the sons of freemen are instructed gratuitously. There are several charity schools and alms-houses. The subscription ball-room is 80 feet by 40, and is very handsomely fitted up. There is a subscription library. The Devon and Exeter Institution for the promotion of arts, &c., has a library which contains about 10,000 volumes. The theatre is a neat building. To the north of the city are the bridewell and the county gaol, both of which are judiciously planned, and contain the governor's residence, chapel, &c. There is also a city prison. The assizes are held by the judges of the western circuit twice a year for the county of the city at the guildhall, and twice a year for Devonshire at the session-house.

By means of a canal, with sluices and floodgates, vessels of 150 tons' burthen can come up to the quay near the city walls.

The municipal borough is divided into 6 wards, and is governed by 12 aldermen (of whom one is mayor), and 36 councillors. Population, 31,312. The parliamentary borough, which returns 2 members to the House of Commons, comprises a population of 37,231.

EXETER. [New Hampshire.]

EXETER COLLEGE, Oxford, was originally founded in 1314, by Walter de Stapledon, bishop of Exeter, who was some time lord high treasurer of England, and it was then called Stapledon Hall. The bishop removed hither his scholars from Hart Hall, and made a foundation for a rector and twelve fellows. In 1404 Edmund Stafford, bishop of Exeter, added two fellowships from the diocese of Salisbury, and obtained leave to give the college its present name. In 1565 Sir William Petre added eight fellowships. Charles I., in 1636, annexed one fellowship for the islands of Jersey and Guernsey. Lastly, Mrs. Shiers, who died in 1700, left certain rents, out of which two fellowships were founded for the counties of Hertford and Surrey. The present foundation consists of a rector and twenty-five fellows, besides whom there are numerous scholarships and exhibitions.

The front of the college, which is opposite Jesus College, extends two hundred and twenty feet, with a large central gateway, consisting of a rustic basement, from which spring four pilasters of the Ionic order, supporting a semicircular pediment, crowned by a balustrade. The greater part of this front was renewed in 1835 with Bath Stone. The hall was erected by Sir John Acland in 1620. The chapel, begun in 1622-3, was completed by Dr. George Hakewill, afterwards rector. The library was erected in 1778, after a design of the late Rev. W. Crowe, public orator.

On the 1st of January, 1848, there were 427 members upon the college books. There are 14 benefices in the patronage of the college. The Bishop of Exeter is the visitor.

(*Oxford University and City Guide*, 12mo.; *Oxford University Calendar*, 1848.)

EXETER or EXON DOMESDAY, the name given to a record preserved among the muniments and charters belonging to the dean and chapter of Exeter cathedral, which contains a description of the western parts of the kingdom, comprising the counties of Wilts, Dorset, Somerset, Devon, and Cornwall. It is supposed, as far as it extends, to contain an exact transcript of the original rolls or returns made by the Conqueror's commissioners at the time of forming the General Survey, from which the great Domesday Book itself was compiled. It is written on vellum in the form of a book of the small folio size, containing 532 double pages.

The most striking feature of the Exeter Domesday, in which it uniformly supplies us with additional knowledge to that in the Exchequer Survey, is the enumeration of live stock upon every estate. There is an account of the number of oxen, sheep, goats, horses, and pigs, exactly in the same manner as it is given in the second volume of the Domesday Book.

The Exeter Domesday was published, with several other surveys nearly contemporary, by order of the Commissioners upon the Public Records, under the direction of Sir Henry Ellis, in a volume supplementary to the Domesday Book, folio, London, 1816.

EXHIBIT, a deed or writing proved by a witness or admitted by the parties in a suit in chancery or in bankruptcy.

EXHIBITION. [School.]

EXILE, EXSILIUM. [Banishment.]

EXMOOR. [Devonshire.]

EXMOUTH. [Devonshire.]

EXOCARPEÆ. [Thymelaceæ.]

EXODUS, THE BOOK OF, is the second of the Pentateuch, or Five Books of Moses, and derives its name from the principal event recorded in it, namely the departure of the Israelites from the land of Egypt, which, in the Greek Septuagint translation, is expressed by the word éxodos (ἔξοδος), that is, a going out. The Book of Exodus records the slavery and cruelty endured by the descendants of Israel (Jacob) under the kings of Egypt; the birth, exposure, and preservation

of Moses; his flight into Midian; his divine mission to Pharaoh; the miracles performed by him and his elder brother, Aaron; the ten plagues inflicted on the Egyptians; the institution of the Passover; the departure of the Israelites from Egypt; their miraculous passage across the Red Sea; the destruction of the Egyptian army; the journeyings of the Israelites in the Arabian desert; their murmurings against God and Moses; their resumption of the Egyptian worship of the calf under the direction of Aaron, and their consequent punishment; the promulgation of the law from Mount Sinai; and the erection of the tabernacle, or portable temple. The king, Pharaoh (a general Egyptian appellation of royalty), for whom the Israelites built the treasure cities, and by whom their male children were ordered to be drowned, is usually considered by the commentators to be Rameses, the eldest son of Sesostris, and the Pharaoh whose army perished in the Red Sea is supposed to be his son and successor, Amenophis the Second, or, according to others, the Third.

The period embraced by the history of this Book is usually reckoned at 142 years, though some computations raise the period to 145 years. The difference is scarcely of sufficient consequence to render an explanation of it necessary. Nearly the whole of the Book is occupied in the detail of circumstances which occurred in the last year of the entire period.

That the Pentateuch is not the production of Moses has been the opinion of some learned critics, both Christians and Jews, as Aben Ezra, Maimonides, Le Clerc, Dr. Middleton, Newton; and in Germany it is generally prevalent among the philosophical theologists of the *rational* school of Eichhorn. But Hengstenberg, Havernick, and others, have most satisfactorily disposed of all their illustrations and arguments, and we may also point out the abundant and constantly increasing verifications which the circumstances recorded in the early chapters receive from antiquarian and historical research, which has produced ample materials for testing the accuracy of the particulars which relate to Egypt and the Egyptians. The result of such comparison shows that the author had a most thorough knowledge of Egyptian institutions and of the spirit that pervaded them; nor do we anywhere discover facts or incidents at variance with the usages and manners of that extraordinary people, or incompatible with their institutions, or with the state of the country. The Book does in fact contain a multitude of incidents and detailed descriptions, which have gained new force from the modern discoveries in the great and interesting field of Egyptian antiquities.

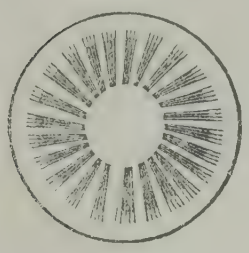
E'XOGENS, the largest primary class in the vegetable kingdom, are so named in consequence of their woody matter being augmented by additions to the outside of that which is first formed near the centre. As long as they continue to grow they add new wood to the outside of that formed in the previous year, in which respect they differ essentially from Endogens, whose wood is constructed by successive augmentations from the

inside. [Endogens.] All the trees of cold climates, and the principal part of those in hot latitudes, are exogenous. In many cases they are easily recognised by the wood of each different year forming a distinct zone, so that a section of their wood exhibits a number of concentric circles; but there are so many exceptions to this rule as to render it necessary to consider this character as by no means essential to them.

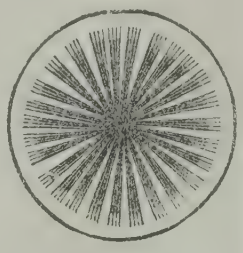
The nature of the exogenous mode of growth will be best compared with that of an Endogen, if we pursue the same mode of illustration as in the article which treats of the latter form. We will therefore proceed from an explanation of the typical mode of growth in a common Exogen to such remarks as we may have to offer upon deviations from it.

In an Exogen of ordinary structure the embryo consists of a cellular basis, in which there is usually no trace of woody or vascular tissue; but, as soon as germination commences, fine ligneous cords, or woody bundles, are seen proceeding from the cotyledons towards the radicles from the opposite sides of the young stem, meeting in the centre of the embryo, and forming a thread-like axis for the root. As the parts grow, the ligneous cords are increased in thickness and number, and, having been introduced among the cellular basis of the embryo, are separated from each other by a portion of the cellular substance, which continues to augment both in length and breadth as the woody cords lengthen. By degrees the plumule, or rudimentary stem, becomes organized, and, having lengthened a little, forms upon its surface one, two, or more true leaves, which gradually expand into thin plates of cellular substance traversed by ligneous cords or veins converging at the point of origin of the leaves. If at that time the interior of the young plant is again examined, it will be found that more ligneous cords have been added from the base of the new leaves down to the cotyledons, where they have formed a junction with the first wood, and have served to thicken the woody matter developed upon the first growth. Those ligneous cords which proceed from the base of the leaves do not unite in the centre of the new stem, there forming a solid axis, but pass down parallel with the outside, and leave a small space of cellular tissue in the middle; they themselves being collected into a hollow cylinder, and not uniting in the middle until they reach that point where the woody cords of the cotyledons meet to form the solid centre of the root. Subsequently the stem goes on lengthening and forming new leaves: from each leaf there may be again traced a formation of woody matter disposed cylindrically as before and uniting with that previously formed, a cylinder of cellular substance being left in the middle; and the solid woody centre of the root proceeds in its growth in a corresponding ratio, lengthening as the stem lengthens, and increasing in diameter as the leaves unfold and new woody matter is produced: the result of which is, that when the young Exogen has arrived at the end of its first year's growth it has a root with a solid woody axis, and a stem with a hollow woody axis sur-

rounding cellular tissue, the whole being covered in by a cellular integument. But, as the woody bundles are merely plunged into a cellular basis, the latter passes between them in a radiating manner, connecting the centre with the circumference by straight passages, often imperceptible to the naked eye, but always present. The following diagram illustrates this:—



Stem.

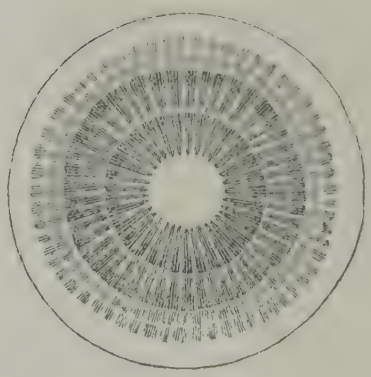


Root.

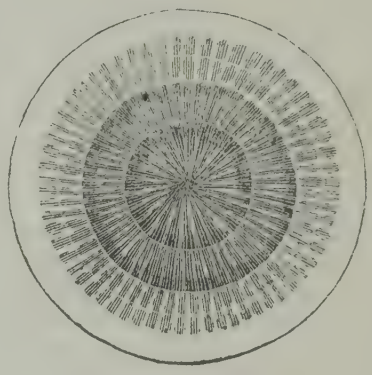
Here we have the origin of *pith* in the central cellular tissue of the stem, of *wood* in the woody axis, of *bark* in the cellular integument, and of *medullary processes* in the radiating passages of cellular tissue connecting the centre with the circumference.

The woody axis is not however quite homogeneous at this time. That part which is next the centre contains great numbers of vessels of different kinds, particularly dotted vessels (vasiform tissue); the part next the circumference is altogether destitute of vessels and consists of woody tissue exclusively: of these two parts that with the vessels belongs to the wood, properly so called, and serves as a mould on which future wood is added; the other belongs to the bark, separates under the form of liber, and in like manner serves as a mould upon which future liber is disposed.

At the commencement of a second year's growth the liber separates spontaneously from the true wood, a viscid substance called *cambium* is secreted between them, and the stem again lengthens, forming new leaves over its surface. The woody bundles in the leaves are apparently prolonged into the stem, passing down among the cambium, and adhering in part to the wood and in part to the liber of the previous year, the former again having vessels intermingled with them, the latter having none. The cellular tissue that connected the wood and liber is softened by the cambium, and grows between them horizontally while they grow perpendicularly, extending to make room for them, and consequently interposed between the woody cords of which they each consist, forming in fact a new set of medullary processes, terminating on the one hand in those of the first year's wood, and on the other in those of the first year's liber. This addition of new matter takes place equally in the stem and in the root, the latter extending and dividing at its points, and receiving the ends of the woody cords as they diverge from the main body. The following diagram illustrates this, and shows, when compared with the last, what difference there is in the appearance of the stem of an Exogen one year old and two years old.



Stem.



Root.

And thus, year after year, the Exogen goes on, forming zone upon zone of wood, which is permanent, and zone within zone of liber, which perishes as the stem increases in diameter.

If this account is compared with that already given of Endogens, it must be obvious that the stem of these two great classes is formed from the very beginning in an essentially different manner. Endogens have no cylindrical column of pith; their woody arcs are never collected into a cylinder, through the sides of which the cellular tissue passes in the form of medullary processes; and the woody matter of their bark, so to call their cortical integument, is not parallel with that of the wood and spontaneously separable from it; not to speak of important anatomical differences, or of the concentric arrangement eventually assumed by the wood of Exogens. The only points in which the growth of the stem of Exogens corresponds with that of Endogens are the following: in both classes the woody matter is connected with the leaves; in both a cellular substance is the basis of the whole structure, and extends horizontally wherever it is necessary to do so; and in certain Exogens, woody arcs, stated to be like those of Endogens, are found in the pith. These cases properly belong to anomalous forms, but nevertheless may be noticed here in consequence of their direct connection with this branch of the subject. One case is that of *Zamia;* but as that genus now belongs to the new class of Gymnosperms, and not to Exogens proper, it need not be considered here. The other cases are *Piper*, nyctaginaceous plants, and some others. Professor Schultz states ('Natürliches System des Pflanzenreichs,' p. 320, &c.) that in *Piper*, *Mirabilis*, and *Boerhaavia*, the central part of the stem

consists of cellular tissue, amongst which cords of spiral vessels and woody tissue are placed either without order, or (in *Boerhaavia*) in a cruciate manner as in tree-ferns, and that on the outside of this the woody bundles are arranged circularly into a cylinder. A similar statement had long previously been made by Mirbel, who ascribes to *Mirabilis* and some umbelliferous plants longitudinal vessels in the pith ('Elém. de Physiol. Végét.,' i. 112), and by Professor Meyer, who finds that the pith of *Mirabilis longiflora* and *dichotoma*, *Boerhaavia scandens*, and *Oxybaphus Cervantesii* abounds in many large bundles of spiral vessels within the woody radiated zone. This, if correctly described, only shows that in certain Exogens a portion of the central tissue is placed at first in a confused manner, and that the wood does not assume a definite circular disposition till afterwards; that it does assume it eventually is admitted. We find in *Piper nigrum* and *Lonchitis* that from the beginning the woody bundles are placed circularly, but they are separated by a good deal of cellular tissue, and do not assume in the first zone the wedge-like or triangular form which is most common in Exogens, and which they themselves at last take on. In *Boerhaavia repanda*, a specimen of which is now before us, we find the wood regularly disposed in two zones, and, instead of spiral vessels, a very singular structure in the pith, which is filled with fistular passages of lax soft spheroidal cellular tissue surrounded by smaller, harder, and more cubical cellular tissue, which passes off into the medullary processes. It is in such plants as *Piper incanum* that the organization of Exogens most nearly approaches that of Endogens; but in the first place the whole race of Pipers forms a sort of transition from Exogens to araceous Endogens; and, secondly, it is probable that when they are most endogenous in appearance they are not really so in regard to the final development of their woody tissue.

The following figures exhibit the appearance of exogenous wood in its most usual and regular structure.

Besides these there are numerous other cases of exogenous wood being sometimes extremely different from the condition in which we see it in Europe, attesting the necessity of forming our ideas of its nature from a more extended examination than that which is commonly given to it.

Irregularity in the structure of exogenous wood is usually owing either to a confused disposition of the tissue at some particular period of the growth, or to some derangement of the medullary processes, or to the absence of concentric circles, or to the formation of a deep zone of cellular tissue alternately with each zone of wood, or to the production of wood within the bark instead of beneath it.

From what has been stated it will be obvious that the most essential features of exogenous vegetation are, not concentric circles in the wood, but an arrangement of the woody matter in a circular manner round pith, its augmentation by external additions, and the universal presence of medullary processes which give the wood a radiated character. With endogenous vegetation it agrees principally in the existence of two systems of growth; one original, cellular, and capable of extending and increasing in all directions; the other perpendicular, capable of augmentation in a longitudinal direction only, and developed subsequent to the first.

In both Exogens and Endogens, therefore, the one system, which we have elsewhere called the fibro-vascular, but which may also be termed the woody, lies across the other, by which it is held together as the threads of the warp in linen are held together by the woof. This appears to be the circumstance upon which the real explanation of all the phenomena of growth in stems must necessarily turn.

If Exogens are distinctly known from Endogens by their peculiar manner of growth, and by the arrangement of their woody matter, they are not less clearly defined by external marks.

Their *leaves* have the veins ramifying from the midrib, or ribs, if there are several, in so intricate a manner as to give the appearance of irregular network. Their veins never run parallel with each other without ramifications; for if, as sometimes happens, they appear to do so, it will be found that the appearance is confined to the principal veins or ribs, and that the secondary veins between them ramify in the usual way. The leaves are moreover in most cases articulated with the stem, leaving behind them a clean scar when they die, not rotting away and hanging upon the stem in the form of a ragged sheath, as is common in Endogens. Moreover they are frequently furnished with stipules, an unusual circumstance in Endogens.

The *flowers* of Exogens are usually constructed upon a quinary type, that is, they have five sepals, five petals, and five stamens, or some power of that number; now and then they vary to a type of four, or they exceeed the number five; but we very rarely find the ternary structure of Endogens present in them. If, as in *Anonaceæ*, *Berberaceæ*, and other orders, the sepals and petals follow a ternary type, the number three is lost in the stamens or the ovary. The natural order *Menispermaceæ* is the only one among Exogens

in which the ternary type regularly pervades all the parts of the flower.

In their manner of growth they rarely resemble Endogens. The consequence of the ramification of the veins is to give their leaves a broad and rounded figure, the effect of which upon their general appearance is to produce the rounded lumpish aspect that we recognise in all the trees naturally inhabiting this country. In no known instance does the stem grow by the development of a single terminal bud; so that we never find in this class the columnar aspect of palm-trees unless the genus *Theophrasta* be considered an exception.

The differences between Exogens and Endogens, thus strongly marked in the stem, leaves, and flowers, are connected with others in the *embryo*. In Exogens of the common kind this organ has two lobes, held together by a minute central body, the upper end of which, between the lobes, is the plumule, or rudimentary stem, the lower the radicle, or rudimentary root; the lobes themselves, or cotyledons, are rudimentary leaves. This structure is readily seen in a hazel nut, or a garden bean; the deviations from it are few and unimportant as compared with those of Endogens. Three or a greater number of cotyledons may be present in a whorl, instead of two opposite to each other. Or one of the two cotyledons may be much smaller than the other, as in *Trapa;* or they may be deeply lobed, as in the garden cress. But in all these cases the deviations are obviously reconcilable with the typical character of being *dicotyledonous.*

When the embryo of an Exogen germinates, the radicle simply lengthens at its point, without having to break through the coat of the embryo: on this account Exogens have been named *exorhizal.*

The result of this examination is, that the great class of Exogens has five important and in some measure independent characters, by which its limits are settled.

1. The wood is exogenous.
2. The veins of the leaves are netted.
3. The fructification is formed upon a quinary or quaternary type.
4. The embryo is dicotyledonous.
5. The germination is exorhizal.

Hence Exogens have received two other names in allusion to such characters; they are commonly called *Dicotyledones,* and *Exorhizæ* is another but less common appellation. Moreover they are the *Phanerocotyledoneæ* of Agardh, the *Anthophytæ* and *Carpophytæ* of Oken's school, the *Dichorgana* of Schultz, and the *Phylloblastæ* of Reichenbach, not to mention other names more obscure.

In consequence of imperfect development, and the abortion or multiplication of its parts, many deviations occur from the above characters. But, as in Endogens, so in these, there is not in consequence any real difficulty in distinguishing Exogens from other plants. Suppose the stem to be so slightly formed, as in *Podostemaceæ* or the aquatic *Haloragеæ,* as not to arrive at a state in which the exogenous arrangement is perceptible, we have the dicotyledonous embryo and the typical number of the floral organs to guide us. Let the leaves appear as scales, as in *Lathræa, Orobanche,* and the like; still there is the embryo, or again the floral proportions. If the fructification is absolutely ternary, as in *Menispermaceæ,* the organization of the stem, leaves, and embryo reveals the true nature of such plants. Or if the embryo is undivided, as in *Cuscuta,* and at the same time the veins of the leaves deficient, and all this with an incomplete formation of woody matter, then the number of parts in the flower remains to prevent our falling into error. It is therefore always to be remembered that the limits of this great class are not exclusively determined by one single character, but by a combination of five; a part of which may be occasionally exceptional or undiscoverable.

Like all other natural assemblages, Exogens have many analogies with other parts of the vegetable kingdom. We have already adverted to the podostemaceous order of this class representing distinctly the pistiaceous order, or at least Lemna among Endogens. In speaking of the latter class other cases have been noticed, and we now add that *Piperaceæ* are distinct analogies here to the *Araceæ* of the Endogens, *Chenopodiales* to *Glumosæ,* and possibly *Menispermaceæ* to *Smilaceæ.*

Whatever uses there may be in the vegetable kingdom are to be found chiefly in this class, which comprehends four-fifths of the natural orders, and probably not much less than the same proportion of species. Timber, in particular, is their exclusive produce; and, if corn has no direct analogy in Exogens, at least a substitute for it is furnished by the potato and the cassava. To speak therefore of its useful products would be, in fact, to explain the utility of plants to man.

Considering the very great numbers of Exogens —they may be rated at 50,000 or 60,000 at a low computation—it is not surprising that it should be here that the systematic botanist experiences his great difficulties. No embarrassment worth notice occurs in the arrangement of Endogens, as has already been shown; but in Exogens the difficulties are so great as to have hitherto baffled the most acute writers. We do not mean with regard to the natural orders themselves, for they are in general well understood and defined; our observation applies to a collocation of the orders, or, in other words, to the construction of groups of a secondary value which shall be as natural and as well defined as the orders themselves. In a recent enumeration we find no fewer than 231 orders of Exogens. It is obviously impracticable to study so large a number of combinations without breaking them into groups, and accordingly various methods have been proposed.

Jussieu, adopting to a certain extent the views of his predecessors, considered, 1st, the separation of the petals; 2nd, their combination; or 3rd, their absence, of primary consequence; and adding to this, 4th, the separation of the sexes in flowers having no petals, he formed the four groups of—1st, Polypetalous; 2nd, Monopetalous; 3rd, Apetalous; and 4th, Diclinous plants. The first three of these he again subdi-

vided according as their stamens or their corolla grew under the ovary (hypogynous), upon the calyx (perigynous), or upon the ovary (epigynous); then the monopetalous epigynous group was subdivided into plants having united stamens, and those having them distinct; the result being eleven classes, which were placed by Jussieu in the following order :—

Apetalous	Stamens epigynous		1
	„ perigynous		2
	„ hypogynous		3
Monopetalous	Corolla hypogynous		4
	„ perigynous		5
	„ epigynous	anthers united	6
		anthers distinct	7
Polypetalous	Stamens epigynous		8
	„ hypogynous		9
	„ perigynous		10
Diclinous			11

This was, however, so artificial a distribution, that botanists soon found it as unsatisfactory as it was simple. Various changes have therefore been recommended from time to time, some of which are the following :—

In 1813, De Candolle, dropping the names of all Jussieu's classes, and abolishing many of them, proposed to arrange as follows the 113 orders of Exogens with which he was at that time acquainted.

Polypetalous	Petals hypogynous (*Thalamiflorœ*)		1
	Petals perigynous (*Calyciflorœ*		2
Monopetalous	Corolla perigynous	*Corolliflorœ*	3
	Corolla hypogynous		4
Apetalous	(*Monochlamydeœ*)		5

Thus the classes were reduced from eleven to five, which was a defect; but those which remained were supposed to be more natural, which would have been an advantage. Five years afterwards, in his 'Regni Vegetabilis Systema Naturale,' he added the names inclosed within brackets, and he broke up the *Thalamiflorœ* into five cohorts, but without stating what orders he arranged under them. We do not find that he ever pursued the subject farther. Since that period this great botanist has occupied himself with the special study of the natural orders, and the public has derived no advantage from his general views, which is much to be regretted.

The following is the outline of an arrangement proposed by Dr. Lindley :—The class is first broken into the *Polypetalous, Monopetalous,* and *Incomplete sub-classes;* the latter are next distributed in *groups;* and, finally, the groups themselves have a subordination of *alliances,* beneath which the orders are disposed in numbers varying from 1 to 8 or more, the general result being 17 groups or 80 alliances. The following table will show upon what principle the groups and alliances have been constructed. It will be remarked that the terminations of the names express their value: the groups or highest combinations end in *osœ;* the alliances, or combinations of a lower kind, in *ales;* the orders in *aceœ;* the sub-orders in *eœ.*

Table of Groups.

Sub-class 1. *Polypetalœ.*

	Groups.
Albumen very considerably larger than the minute embryo.	*Albuminosœ.*
Albumen absent, or only forming a layer between the embryo and the seed-coat.	
Ovary inferior (often with an epigynous disk).	*Epigynosœ.*
Ovary superior.	
Placentæ parietal.	*Parietosœ.*
Placentæ in the axis.	
Calyx dislocated.	*Calycosœ.*
Calyx complete; its parts being all on the same plane.	
Carpels united in a solid pistil, parallel with each other	*Syncarposœ.*
Carpels oblique, upon a gynobase	*Gynobaseosœ.*
Carpels disunited.	*Apocarposœ.*

Sub-class 2. *Incompletœ* (or *Apetalœ*).

Calyx altogether absent	*Achlamydosœ.*
Calyx present.	
Embryo curved round albumen.	*Curvembryosœ.*
Embryo straight.	
Stamens monadelphous	*Columnosœ.*
Stamens distinct.	
Calyx tubular, often resembling a corolla	*Tubiferosœ.*
Calyx very imperfect	*Rectembryosœ.*

Sub-class 3. *Monopetalœ.*

Fruit consisting of but one perfect carpel	*Aggregosœ.*
Fruit of several carpels.	
Ovary inferior	*Epigynosœ.*
Ovary superior.	
Carpels three or more	*Polycarposœ.*
Carpels only two.	
Fruit nucamentaceous	*Nucamentosœ.*
Fruit capsular.	*Dicarposœ.*

These groups are again subdivided into alliances, and the alliances embrace the families or orders.

EXORCISM (ἐξορκισμός), the form of adjuration, or charging upon oath, by which evil and malignant spirits were said to be subjected to command or driven away.

EXO'STEMMA, a genus of plants belonging to the natural order *Cinchonaceœ.* The species are trees or shrubs, with lanceolate oval short-stalked leaves and stipules solitary on each side of the petioles. *E. caribœum,* Quinquina Piton, Sea-side Beech, is a tree about twenty feet high, and a native of the Caribbee Islands, Guadaloupe, St. Domingo, Jamaica, Santa Cruz, and Mexico. This plant is the *Cinchona caribœa* of Jacquin and the *C. Jamaicensis* of Wright. The capsules before they are ripened are very bitter, and produce a burning itching when applied to the nostrils and lips. The bark is also bitter, and possesses a tonic, febrifuge, and emetic action on the system, but it does not appear to have either quinine or cinchonine in its composition. The

bark is generally smooth and gray on the outside. *E. floribunda*, Quinquina of St. Lucia, is a native of the West India islands, among woods by the side of torrents. The bark is similar to the last, and used as a substitute for the Peruvian bark, but Pelletier and Caventou discovered no quinine or cinchonine in any part of the plant. *E. Souzanum*, Quinquina de Piauhi, is a native of Brazil, and is used as a substitute for the Peruvian bark. Buchner found in it an alkaloid, which he called Esenbeckine, on the supposition that this plant was an Esenbeckia. The alkaloid was probably cinchonine. *E. Peruvianum*, the *Cinchona Peruviana*, of Poiret, is a tree ten or twelve feet high, and grows in the colder parts of Peru, on the declivities of the Andes, between the river Chota and the village of Querocotillo, 3000 feet above the level of the sea. The bark is very bitter, and has a sweetish taste with a nauseous smell. There are several other species of Exostemma, which have also been used as cinchona barks, but the above are those which are best known.

EXOSTOSIS (ἐξόστωσις), a swelling or tumor of a bone. This term has been applied very generally to all tumors of the bones, whether they partake of the characters of osseous structure or not. True exostosis is an hypertrophy of the tissues which constitute the bone. Hypertrophy of a bone may arise from natural causes, and is produced by any thing which constantly increases the action of a part.

The more frequent cause of an exostosis, which requires treatment, is the production of increased action of the part by the application of some stimulus. It is difficult frequently, in bones, to trace the increased action to the true cause. It sometimes however follows a blow, and some persons are so predisposed to take on this form of action, that slight injuries are followed by exostoses. The structure and density of exostoses vary much. Sometimes they exhibit a light cellular structure, like the cancellated structure of bones, and are frequently much lighter and more cancellar than is ever observed in this structure in its normal development. At other times the structure of the exostosis is much harder than common bone, and possesses all the characters of ivory. The cancellated structures sometimes attain a considerable size, but the ivory exostoses seldom exceed the size of a bean. The first are most common on the long bones, as the femur, tibia, humerus; the last on the cranium and bones of the face. Sometimes the increased action of the tissue extends to the whole bone, and every part is enlarged. No kind of external treatment is beneficial in any of the forms of exostosis; and when, on account of their position, it is thought right to treat them, they must be removed. The operation consists in sawing or cutting away the bony tumor, which may be done by a trephine, Hey's saw, or Liston's cutting pliers. Of course this operation should only be performed when it can be done without danger to neighbouring organs. Even when the whole of the projection cannot be removed, it will often be found of advantage to take away a part.

EXOTERIC and ESOTERIC (ἐξωτερικός and ἐσωτερικός), literally 'external' and 'internal,' were two terms used in reference to the writings and doctrines of many of the ancient Greek philosophers. The general distinction between the classes of works called by these respective names is this: the 'exoteric' were those writings which were in a more popular form; the 'esoteric,' those which were written in a scientific and more exact form.

EXPANSION. [Heat.]

EXPECTORANTS are medicinal agents, which, in certain conditions of the system, will, either by promoting or repressing the secretion of the air-passages and of the lungs, facilitate its expulsion. The articles which bear this name differ considerably as to the means by which this end is accomplished. They are chiefly derived from the vegetable kingdom, some being gum-resins, or balsams, of a stimulating quality, while others are possessed of nauseating or sedative properties; vapours also are expectorants, and may be either simple, as that of warm water, or medicated with different impregnations. Vapours alone reach the organs to be affected, and are therefore the only direct expectorants; the others, being taken into the stomach, must operate by sympathy or some other obscure agency.

From the differences in the nature of the substances regarded as expectorants, it is clear that they must operate in a very different manner, according to the state of the system, the pathological condition of the lungs, and the stage of the complaint. Great care is necessary in selecting the particular agent suited to each case, and in no set of diseases are greater errors committed by unprofessional persons by an injudicious employment of these agents than in those of the lungs, from common colds to the more serious and fatal affections of these vital organs. The slight nature of many of the common maladies of the throat and lungs, and the fatality of consumption, have led to a degree of interference with the treatment of diseases of these organs not attempted in any other cases, as the multitude of popular remedies for coughs, colds, and consumptions attest.

To treat satisfactorily the diseases of the lungs, it is necessary to know their structure and the relations they have to the other parts of the body. The bronchia (or air-passages) and air-cells of the lungs are lined by a mucous membrane, and have of consequence relations of sympathy with the skin and intestinal canal more close than with any other part of the system. A vicarious discharge or secretion is thrown off by the internal (pneumogastric) or external surface (the skin), and any considerable diminution of this discharge on the part of either is in some degree compensated for by augmented secretion of the other. Hence, when the insensible perspiration of the skin is suddenly checked by exposure to cold, a double duty is thrown upon the internal membrane, sometimes of the intestines, when diarrhœa may result, sometimes of the lungs, when catarrh (common cold) or pneumonia may ensue. This fact enables us both to comprehend the cause of some of the diseases in which expectorants are proper, and their mode of aiding the cure.

Where there is decided inflammation, the best

expectorants are those which lessen the inflammatory state, such as venesection and nauseating doses of tartrate of antimony or of ipecacuanha, and the inhalation of the vapour of warm water, simple or medicated, by means of Mudge's Inhaler. But, as the use of any such instrument requires considerable exertion of the respiratory organs, where the inflammation is violent it is inadmissible, as the lungs must be kept in as tranquil a state as possible; but the head may be held over a basin of warm water, the vapour of which will be received by the lungs in the ordinary course of respiration.

When the inflammation has subsided, the more stimulating expectorants may be used. Where there is first spasm hindering secretion, and ultimately an excessive exhalation which must be cleared away, a combination of a sedative or antispasmodic medicine with the expectorant is best.

These are the principles which should regulate our choice in the more acute affections of the chest; but, as no set of organs are so subject to chronic disorders as the lungs and their appendages, we frequently have recourse to expectorants to alleviate many of the symptoms attendant on them.

Lessening the tendency of blood towards the lungs, and directing it more towards the skin, is of service both in acute and chronic affections of the chest. Hence bathing the feet in warm water on the first feeling of an attack of cold, followed by antimonials or other diaphoretics, is of much utility, if the patient go into a warm bed immediately; while, on the same principle, the use of flannel next the skin is the best preventive, and is indispensable for all delicate persons, particularly if predisposed to diseases of the lungs.

EXPLOSION is the sudden displacement of gaseous particles, accompanied by a loud report. The bursting of a bladder under the air-pump, the bursting of a steam-boiler, and the firing of gunpowder are examples. The explosions which, in the atmosphere, accompany a flash of lightning [THUNDER] are ascribed to the rush of air into the vacua produced when the aqueous vapours in large portions of space become rapidly condensed. DETONATION is a species of explosion.

EXPONENT. In the algebraical expression a^x, x is called the exponent of a. If we were strictly to preserve the most ancient meaning of the term, x would be called the exponent of the whole symbol a^x; but it is usual to call x the exponent of a, and the logarithm of ax.

EXPORTS. [IMPORTS AND EXPORTS.]

EXTENT (Lat. *extenta*) is a writ of execution (sometimes called an *extendi facias*), which is directed to the sheriff against the body, lands, and goods, or the lands only, of a debtor; and it is also used as signifying the act of a sheriff or officer upon the writ itself.

The king by ancient prerogative is entitled to this writ, either in chief or in aid for the purpose of obtaining satisfaction of debts originally due to him or assigned to the crown.

The writ of extent for the subject is founded upon a recognisance at common law or by statute, or upon a judgment in an action of debt against an heir, on the obligation of his ancestor. It is very similar in its effects and mode of execution to the other writs of extent. [ELEGIT.]

When lands are delivered over to a creditor upon an extent, a reasonable but not the real value is set upon them; and the effect is the same as if the creditor took a lease of the lands until his debt is satisfied. The time during which the creditor will hold the lands will of course be determined by a comparison of the value set on the lands with the amount of the debt.

(Coke *on Littleton;* Tidd's *Practice;* Blackstone's *Commentaries.*)

EXTORTION. 'Extortion,' says Coke (Co. Litt., 368, b.), 'is a great misprision, by wresting or unlawfully taking by any officer, by colour of his office, any money or valuable thing of or from any man, either that is not due, or more than is due, or before it is due.' It is an offence at common law, punishable by fine and imprisonment at the discretion of the court. Also, money which has been obtained by extortion may be recovered in an action at law. There are various statutes providing penalties for extortion by sheriffs, undersheriffs, bailiffs, gaolers, clerks of assize, &c.

EXTRACTION OF ROOTS. [INVOLUTION AND EVOLUTION.]

EXTRACTS are medicinal preparations of vegetable principles, obtained in various ways. Sometimes they are merely the juices expressed from the fresh plants, brought by careful evaporation to the consistence of honey, and then more properly denominated *inspissated juices;* at other times they consist of certain principles of the fresh or dried plant extracted by some menstruum in which they are soluble, such as water, proof spirit, or vinegar, and afterwards evaporated, as in the former case. According to the nature of the menstruum employed the extract is called *watery, alcoholic,* or *acetous.*

The preparation of extracts requires the greatest care. The plants must be in every respect of the best quality, as regards the place of their growth, season when collected, &c., and the evaporation must be conducted rapidly, yet at a low temperature. Extracts are simple or compound, according as they are prepared from one plant or from several different kinds.

A well-prepared extract should possess in a great degree the odour, and especially the taste, of the plant from which it is obtained; it should not have either an empyreumatic smell or taste, and it should have a proper and uniform consistence. It is necessary to preserve extracts in a dry situation: to assist in keeping watery extracts, it is customary to sprinkle a little alcohol over the surface before covering them up; but watery extracts, if made with cold water and due care, rarely require this precaution. It is proper to examine the condition of all extracts very frequently, both during very warm and very wet weather: any portion which seems spoiled should be immediately thrown out.

EXTRAVASATION (*extra,* without, *vas,* a vessel), in Medicine, signifies the escape of any of the fluids from its natural reservoir or canal into some neighbouring cavity or texture. It is most

commonly employed in designating effusions of blood or of urine.

Extravasations of blood are always serious and often fatal when the larger vessels and more important organs are concerned in them. Thus, if blood escape in consequence of the rupture of an aneurism of the aorta into the bag which incloses the heart, the circulation is immediately arrested, and sudden death ensues. Such an accident is said to be an extravasation of blood into or within the pericardium.

Blood is sometimes driven with great force from a ruptured or wounded artery into the loose spongy substance consisting of connected cells which surrounds and separates the various organs, and is found in great abundance in every part of the body. Contusions are followed by extravasation of blood into the cellular tissue under the skin and in the skin itself from the rupture of small vessels; and this is the reason of the dark colour assumed by the bruised parts, which often extends to a considerable distance from them; as in the familiar instance of a black eye. This superficial extravasation is generally called *ecchymósis*, a word of the same import.

Spontaneous extravasations of blood, allied to those last mentioned, frequently take place in the progress of various diseases, of which they may be causes or symptoms. The spots which appear under the skin and beneath the membranes which line the internal cavities and tubes, in plague, typhus fever, sea-scurvy, and other complaints, are of the symptomatic kind; and these, as well as the discolorations after contusions, are included in the general term *ecchymosis;* they are also known by various other names, as *vibices* (wheals), *petechiæ*, and *purpura*.

One of the most common causes of apoplexy is an extravasation of blood into the substance of the brain, or between its membranes, from the simultaneous rupture of many minute arteries. It likewise happens very commonly in the early stage of consumption, when the body is yet full of blood, and the substance of the lungs is rendered brittle and inelastic by the deposit of tuberculous matter. When it occurs in the lungs, the injury is attended with *hæmóptysis*, or spitting of blood.

Extravasations of urine may take place in consequence of rupture of the bladder or urinary passages from ulceration, mechanical injuries, or any cause that produces distension to a great degree. If the fluid escape into the cavity of the abdomen, the result is uniformly and speedily fatal. If it insinuates itself into the cellular tissue in the neighbourhood of the neck of the bladder or the urethra, the accident is still a very serious one, though it generally admits of cure if the nature of it be immediately recognised. The fluid, which is highly deleterious, must be promptly evacuated by free incisions, and care must be taken to prevent further infiltration.

EXTREME AND MEAN RATIO. To cut a line according to extreme and mean ratio is a phrase of Euclid which it is not very easy to explain from the words of it. The meaning is, to cut a straight line in such a manner that the whole shall bear to the greater part the same ratio as the greater part to the less; or to make the greater segment a mean proportional between the whole and the less. Accordingly the square of the greater segment must be equal to the rectangle under the whole and the less segment: and Euclid shows how to make this section in the 11th proposition of the 2nd book.

EYALET, the name of the chief administrative division of the Turkish empire, formerly called a pashalik. The whole empire is divided into Eyalets, which are subdivided into Livas, or Sanjiacks. Each Eyalet is under the government of a pasha of two tails.

EYCK, HUBERT VAN. This celebrated old Flemish painter, the elder brother and master of John Van Eyck, was born, according to Van Mander, in 1366, and probably at Eyck (now Alden Eyck), a small village near Maaseyck on the Maas. The two brothers established themselves first in Bruges and afterwards in Ghent. The name of Hubert Van Eyck is nearly lost in that of his younger brother and pupil John, apparently from no other reason than that John alone is mentioned by Vasari in his story of the invention of the new method of oil-painting, while he takes no notice whatever of Hubert.

EYCK, JOHN VAN, was born at or near Maaseyck, as is generally said, in 1370. There are however some reasons for supposing John to have been born much later than 1370.

Van Mander says that the two brothers must have painted in their new method as early as 1410; and as Hubert did not die till September 18, 1426, according to the inscription on his tomb in the church of St. Bavon at Ghent, they worked a sufficient number of years together to completely develope it in practice. John Van Eyck cannot have been very old in 1426, as, according to an authentic lottery notice of his widow, though alive in 1445, he died before February 24, 1446, and he was still young when he died, according to Marcus Van Vaernewyck, who published a 'History of Belgium' in 1565. This is somewhat corroborated by a portrait of John in the Museum of Berlin, dated 1430, in which he appears about thirty-five years of age. John was therefore about thirty years younger than his brother Hubert, supposing the latter to have been born in 1366, and accordingly he can have been at first but little more than the assistant of Hubert in their masterpiece, the 'Adoration of the Lamb,' the great altar-piece of St. Bavon's, Ghent, which was finished by John in 1432. His name is clearly subordinate to Hubert's in the inscription on the work, which is as follows, the last verse being a chronogram:—

'Pictor Hubertus e Eyck, major quo nemo repertus,
Incepit; pondusque Johannes arte secundus
Frater perfecit, Judoci Vyd prece fretus
VersV seXta MaI Vos CoLLoCat aCta tVerI.'

The capitals in the last line, when added together according to their value as Roman numerals, make 1432. The altar-piece is about 14 feet wide by 12 high, and is in two horizontal divisions, each centre covered by revolving wings or doors, two on each side. There are twelve pictures in all, containing about sixty figures and

three hundred heads. An elaborate copy of it was made by Coxie for Philip II. of Spain. The colouring of the whole work is beautiful, and many parts are admirably executed, and the painting is still in excellent preservation, owing to the excellent method discovered by the Van Eycks. The fate of the original is remarkable, and much to be regretted. It remained entire till the French, getting possession of Belgium, of course turned their eyes to so rich a prize. The clergy of the cathedral of St. Bavon succeeded in concealing eight of the twelve panels, so that only four were taken to Paris, whence they were brought back in 1815. Six of the panels were sold, and they are now in the Royal Museum at Berlin.

This medium of the Van Eycks was not merely *oil;* it was several oils mixed with resins, or some such substances, and prepared by fire. Many useless and intemperate discussions have arisen from Vasari's attributing the invention of *oil-painting* to John Van Eyck, but they are due chiefly to a careless or partial consideration of what Vasari really says. The words of Vasari are: 'At last, having tried many things separately and compounded, he discovered that linseed and nut-oils were the most siccative: these therefore *he boiled with other mixtures,* and produced that varnish (vehicle) which he, and indeed every painter in the world, had long desired.'

(*Messager des Sciences et des Arts,* Gand, 1824; *Kunstblatt* in 1824 and 1826; Passavant, *Kunstreise, &c.;* Rathgeber, *Annalen der Niederländischen Malerei.*)

EYE, the organ of vision. The peculiarities of structure in the eyes of every animal which has the power of seeing have a close relation to its habits and mode of existence. The eye may be simple or compound, single or multiplied, fixed or moveable; it may be deeply imbedded in a bony socket, or may project from the head at the extremity of a sensitive and retractile horn. Yet, in all the varieties of configuration, the essential parts are similar, and are constructed on the same general principles.

The object, or what may be called the general problem, of the beautiful mechanism of the human eye is to combine distinctness and extent of vision with the security and maintenance of the organ, and the utmost convenience in using it. The parts associated for these purposes are the orbits, or sockets, of the eye; the optic nerve; the eyeball, or globe, with its contents, and the external muscles which move and suspend it; the eyelids; the lachrymal apparatus; the nerves and vessels which supply these parts, and the mass of fatty and cellular substance which isolates and supports them. We shall describe these parts nearly in the order in which they have been enumerated.

The eyes with their appendages are lodged in two symmetrical roomy cavities or orbits in the skull, completed in front by the eyelids, but elsewhere entirely circumscribed by bone, the office of which, it need hardly be said, is to protect them from injury, and from any pressure that might embarrass the perfect freedom and precision of their movements. These cavities are called the *orbits, orbital fossæ,* or *sockets,* of the eye. Seven bones of the cranium or face enter into the composition of each. Numerous openings and holes exist in these cavities for the transmission of the nerves and blood-vessels, which supply the eye itself as well as its muscular apparatus.

The *optic nerves,* arising at the back part of the brain, pass horizontally forward above the floor of the cranium, converging towards each other till they meet, when they become closely united. Beyond the point of junction the nerves again diverge from each other, and, passing into the optic foramen, become invested in a tough, flexible, and fibrous sheath, which is a tubular production of the strong membrane called the dura mater, which lines the cavity of the skull. The nerves, continuing to diverge, reach the eyeball after a somewhat tortuous course of an inch in length. Their length is such as to allow the eyeball to project slightly beyond the edge of the socket in front, and to afford space behind for the action of the muscles which move it, and a suitable distance between their points of attachment. The optic nerve does not consist, like other nerves, of a bundle of distinct fibres, but of a medullary pulp inclosed in minute transparent tubes. The sheath is pierced half an inch from the globe by a vessel called the arteria centralis retinæ, which, accompanied by several small veins, reaches the axis of the nerve, and passes with it into the interior of the eye. The nerve does not enter the back of the globe exactly in the axis of vision, but about the fifth part of an inch from it, in a horizontal line, on the inner or nasal side, and subtending an angle of about 23° at the centre of the eye. At this point the dimensions of the sheath are suddenly contracted, and it terminates in a thin cul-de-sac, pierced with minute holes or pores, hence called the lamina cribrosa (sieve-like plate). Through these pores the pulp of the nerve, divested of its tubular involucra, passes into the interior of the globe in divided portions, but, immediately reuniting, expands at the back of the eye into a delicate cup-shaped membrane, with the concavity directed forwards. This expansion of the optic nerve is called the *retina;* it is the most important part of the eye, having a peculiar and exclusive sensibility to the impressions of light, of which immediate notice is conveyed from it along the nerve to the brain.

The most elementary fact that we know respecting light is, that it proceeds in straight lines or rays from every point of a luminous or illuminated body. A sensitive surface or retina presented nakedly to such a body would therefore intercept innumerable cones or pencils of light, each diverging from a different point of the object. But each point of the retina must also be considered in that case as the apex of a cone of rays converging upon it from every part of the object; and it is manifest that the various impressions thus received upon the same point at the same time would be undistinguishable from each other. All therefore that we can conceive to be communicated to the mind by the sum of such indefinite impressions over the whole retina, is a

knowledge of the prevailing colour of the object, and possibly a general idea of its direction. But if there were more objects than one, or that one had 'parts or magnitude,' even this inconsiderable addition to the mere sense of light and colour would be impossible. The confusion resulting from the simultaneous impressions of a multitude of pencils of light on the same surface would be partly removed if the seat of perception were placed at the bottom of a cavity capable of being turned to each object or each part of the same object in succession, inasmuch as this would prevent the interference of rays proceding from parts not actually under contemplation; but an indistinctness would still remain in proportion to the magnitude of the field of view, only remediable by narrowing the cavity to a mere capillary tube, upon the inconvenience of which we need not enlarge.

Let us consider what would be the effect of a very simple addition to the cavity. We will suppose it to be closed in front by a dark screen, perforated with a small central hole as in the section represented in *fig.* 1.

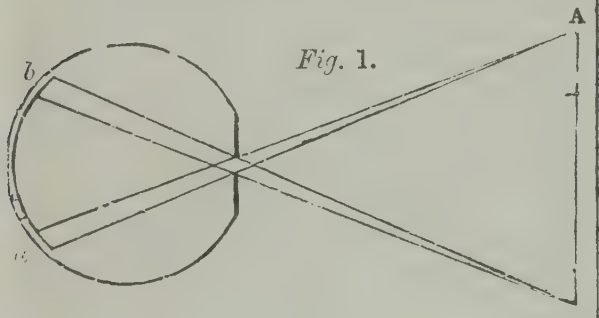


Fig. 1.

In this case pencils of rays crossing each other from A and B, the top and bottom of an object, would impinge at *a* and *b* upon different parts of the retina. By this means the advantages of a large and a small field of view would be combined, a distributed impression of the object would be produced, and its several parts would be seen separately and in their proper relative situations. The effect may be easily shown by holding a card, pierced with a smooth circular hole, near a taper, and throwing the spectrum upon a wall at a little distance. Such a screen is termed the iris.

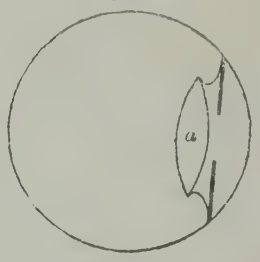
But still the rays from each point of the object would be diffused over a space, instead of being collected upon a separate point of the surface, and the impressions of contiguous pencils would in some degree overlap and confuse each other. This inconvenience might be lessened by contracting the opening, but another cause of indistinctness would then be introduced in the diminished admission of light.

Both evils might be avoided if a lens of a proper construction were fixed behind the screen as at *a*, in *fig.* 2. Pencils diverging from single points of the object would thus be admitted through the opening, which we will call the pupil, and would be made to converge to single points on the surface, and the impression would now be an exact counterpart of the object, A being distinctly seen in its true place and direction from *a*, and B from *b*.

But additional provisions would be necessary to bring this arrangement to the requisite degree of perfection. In the first place the retina must be adjusted to correspond in shape with the focal distance of the lens. This purpose might be accomplished, if the walls of the cavity were composed of flexible materials, by interposing a transparent fluid between the lens and the retina, which, by its uniform distension, would constrain the latter to take and retain the form of a portion of a sphere.

Again, if oblique as well as direct pencils are to be brought to a focus, that the lateral vision may be also distinct, a second refracting body, of a proper form, must be placed in front of the lens. This may be done very conveniently, with the further advantage of completing the cavity, by adding a transparent portion to its walls in front of the screen, to be likewise distended with fluid in order to keep it in the shape of a segment of a sphere. (*Fig.* 2, *a.*)

Fig. 2.



It is also desirable that the back of the screen and the interior of the cavity should be blackened, that the rays may be extinguished after impact upon the retina, lest any internal reflection should interfere with the impressions on other parts. The expediency of this provision is always kept in view in the construction of optical instruments, and may be made evident by looking at a bright object through a polished metal tube. The colouring matter is called the pigmentum nigrum, or, simply, the pigment.

The only remaining artifice is to endow the pupil with the faculty of contraction and enlargement according to the quantity of light. If it were of a constant size, more light would be concentrated upon the retina from a bright or a near object than from one comparatively distant or faintly illuminated; and, as the sensibility of the retina must remain the same, the disproportion would occasion dimness of sight in one case and dazzling in the other, and might even impair the nerve.

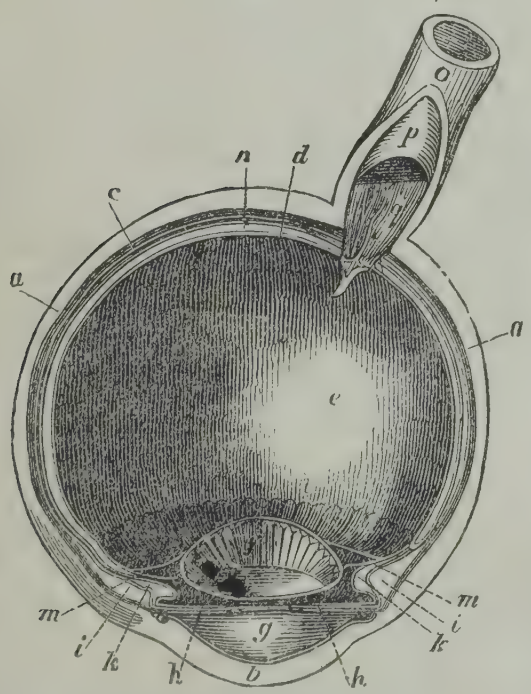
The figure thus imagined will give some idea of the most important parts and general structure of the eye. We shall now give an account of the principal features in its real anatomical structure.

The *Globe*, or *Eyeball*, contains the parts immediately concerned in vision. It consists of very unequal portions of two spheres of a different size, which have a common circular intersection in a transverse vertical plane, much nearer the front than the back of the eye. The iris, or coloured screen, perforated centrally by the pupil, nearly

occupies the situation of this imaginary plane, but is, strictly speaking, behind it. The posterior and larger portion is circumscribed by the sclerotic membrane, except in front, where it may be considered as bounded by the iris: it is rather less than an inch in diameter, and constitutes about five-sixths of the surface of the globe. The included space is occupied by the choroid membrane and retina, the vitreous and crystalline humours, the ciliary body and processes, and a small part of the aqueous humour. The anterior portion, which forms about a quarter of a sphere, thirteen-twentieths of an inch in diameter, and occupies the remaining sixth part of the surface of the globe, contains the rest of the aqueous humour, and is bounded in front by the transparent and slightly prominent disc set in the sclerotic like a watch-glass in its metallic rim, and known as the cornea from its horny texture. Its transverse chord, or the diameter of the circle of union between the cornea and sclerotic is nearly half an inch in length.

The globe derives its firmness to the touch from the distension of the contained fluids: its capability to bear that distension, which insures the permanence of its shape, is due to the flexible but strong and inelastic outer covering or tunic, consisting, as we have said, of the sclerotic and cornea.

Fig. 3.



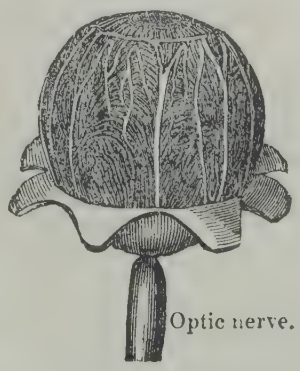
Section of the Globe of the Right Eye through the Optic Nerve.

a, sclerotic; *b*, cornea; *c*, choroid; *d*, retina; *e*, vitreous humour; *f*, crystalline humour or lens; *g*, aqueous humour; *h*, iris; *i*, ciliary ligament; *k*, ciliary processes; *l*, ora serrata of the ciliary body; *m*, canal of Petit; *n*, foramen of Soemmering; *o*, sheath of the optic nerve; *p*, substance of the nerve; *q*, arteria centralis retinæ.

The *sclerotic membrane* is a tough elastic tissue, and appears as an expansion of the external sheath of the optic nerve. To this membrane the muscles which move the eye are attached. It

is covered externally by a transparent mucous membrane called the conjunctiva.

Fig. 4.



The sclerotic partly removed, and the rest turned back, showing the choroid coat and iris.

The *cornea* is a kind of transparent continuation of the sclerotic; it has however a peculiar structure. It is covered by the conjunctiva, and allows of the passage of the rays of light.

The *choroid membrane* (*fig.* 4) is a thin soft dark brown structure, in contact with or lining nearly the whole concave surface of the sclerotic. It may be said to originate around the entrance of the optic nerve, which passes through it before it expands into the retina. The choroid consists almost entirely of a multitude of minute vessels, curiously interlaced, and communicating freely with each other. It is supplied with blood by fifteen or twenty branches of the ophthalmic artery, which pierce the sclerotic round the entrance of the nerve.

The *pigmentum nigrum* appears under the microscope to consist of hexagonal particles arranged side by side like the cells of a honeycomb. It adheres very loosely, so that, when the surfaces covered with it are drawn to and fro in water, it becomes diffused, and may be washed off. On the inner surface of the choroid the pigment is retained by an extremely fine expansion called Dalrymple's membrane.

The *optic nerve*, having entered the interior of the globe through the sclerotic and choroid membranes, forms a slight prominence at the point of union of its several portions, and thence spreads out in the form of a fine transparent membrane over the whole concave surface of the choroid, embracing the translucent body called the vitreous humour. This expansion is called the retina. (*Fig.* 3, *d.*) Towards the choroid it appears to consist of a mere homogeneous pulp, not very different from the medullary matter of the brain; but it is undoubtedly most elaborately and minutely organised. Its name may have been derived from the network formed by the branches of the central artery; at least it is not otherwise applicable to the structure of the membrane.

The *vitreous humour* (*fig.* 3, *e*) is a transparent fluid of semigelatinous consistence and high refractive power, constituting about five-sixths of the bulk of the globe. It consists of a fluid differing in no great degree from water, contained in a cellulated structure called the hyaloid membrane (ὕαλος, glass), from its perfect translucency. The

minute cells are connected together; for, if the external part be punctured, the fluid contained in them gradually drains away.

The *lens*, or *crystalline humour* (*fig.* 3, *f*) is imbedded in a deep depression in the front of the vitreous humour, a little nearer the nasal than the temporal side of the globe. It has the form and function of a double convex lens. The surfaces may be considered as portions of two unequal spheres, the anterior being considerably flatter than the posterior. The diameter of the sphere of which the former is a segment is about eight-twelfths, of the latter five-twelfths of an inch. The thickness of the lens, measured in the axis of vision, is about the sixth part of an inch, and its transverse diameter is about twice that length. In refractive power it is superior to the other transparent substances contained in the eye. Its consistence is gelatinous, increasing in density from the circumference towards a central nucleus, which has the tenacity of soft wax. It is composed of an infinite succession of thin concentric laminæ, arranged with the utmost regularity one within another like the coats of an onion; and every such stratum or elliptic shell is made up of a series of exquisitely minute fibres laid side by side, forming three septa like the cloves of an orange, of which the bounding or cleavage planes diverge from the axis of the lens at angles of 120°.

The *aqueous humour* (*fig.* 3, *g*) is in no respect distinguishable from water except in holding a minute portion of several saline ingredients in solution; it occupies the space between the lens and the cornea. The iris divides this space into two unequal portions called the anterior and posterior chambers of the eye, and so closely approaches the lens, that near the margin of the pupil the two surfaces are separated by a mere film of aqueous humour.

The *iris* (*fig.* 3, *h*) arises from the anterior margin of the ciliary ligament, and is extended, as we have seen, across the aqueous humour in the form of a thin partition, with a round aperture, or *pupil*, of variable size in the centre, or a little nearer the inner side, the function of which, we need hardly repeat, is to regulate the quantity of light admitted into the eye, by contracting when it is in excess, and dilating when it falls short of the due amount.

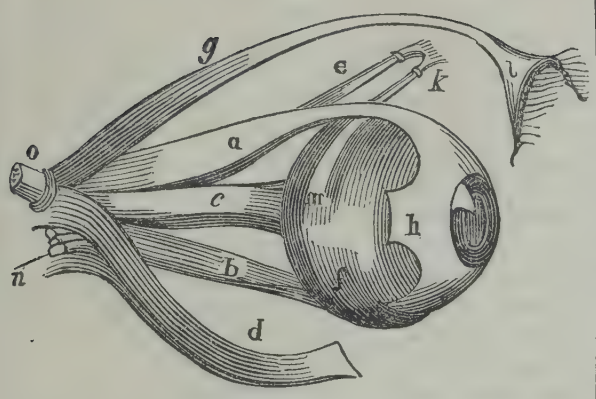
The external appearance of the iris is too familiar to need a particular description. It is covered in front with a glistening polished membrane. The brilliancy of the eye depends in a great measure upon the light reflected by this surface, and is lost when its smoothness and transparency are impaired by inflammation. The posterior surface of the iris is called the *uvea*. It is thickly coated with pigment, which is prevented from diffusing itself in the aqueous humour by a membrane like that of Dalrymple on the choroid. Such a provision is particularly needed here on account of the quick movements of the part in a watery fluid. The colouring matter of the iris has much analogy with the pigment. Like that substance, it forms no part of the texture it pervades, and when the outer membranes are removed by maceration in water it may be washed away. Both have a relation in quantity as well as in depth of tint to the complexion and colour of the hair. In the negro the iris is of so dark a hue that it can scarcely be distinguished from the pupil; while in the white rabbit and other albinoes, including the human variety, where the pigment is entirely wanting from some original malformation, the substance of the iris is transparent, and reflects only the pink colour of the circulating blood. Such eyes are dazzled by a strong light, and probably see better than others in the dusk. The iris, if minutely injected, appears, like the choroid, to be composed almost entirely of vessels, and is also richly supplied with nerves.

The *pupil* in the human eye is bounded by a sharp, well-defined circular edge. In other animals its shape is subjected to many varieties which may often be explained by a reference to their habits and circumstances. In fish it is generally crescentic or imperfectly quadrangular. In herbivorous animals, which often continue to browse during the night, it is oblong and obliquely transverse, as in the horse and sheep. In most serpents and many rapacious quadrupeds, both aquatic and terrestrial, the pupil, though round and large at night, is a mere vertical slit when seen by day, especially in the smaller species of each genus, as in the common cat. It is curious that in the larger cats, as the lion and tiger, as well as in some of the larger four-footed reptiles, the pupil again becomes circular. In all birds, we believe, the pupil is round; and it may be observed that, with few exceptions, they all sleep after night-fall. In the few nocturnal species, as the owls, the pupil is very large though still round, and these birds always shun the day. The long narrow pupil is in fact a provision for a greater variation in size than the circular form permits, and is generally found in those animals which roam at night and also see well by day.

The *ciliary body* (*fig.* 3, *l*) rests upon the compressed anterior surface of the vitreous humour where it curves inwards from the sclerotic towards the lens, a thin dark annular band, about the fifth part of an inch in breadth, consisting of a frill of flat converging plaits, which encircle but do not reach the circumference of the lens. It is everywhere thickly coated and pervaded with pigment, except at the extremities of about seventy minute unattached points which fringe the inner margin, and radiate towards the lens like the florets of a marigold round its central disc. These are the ciliary processes. (*Fig.* 3, *k.*) They are separated from the uvea by the fluid of the posterior chamber, and are received behind into corresponding depressions in the vitreous humour.

The movements of the globe are effected by six muscles arising from the bony surface of the orbit, and inserted into different parts of the sclerotic. Four are called recti, that is straight or direct muscles; the fifth and sixth are the obliqui superior and inferior, so called from the obliquity of their insertion, and their respective positions above and below the globe. The fifth or superior oblique is also called the trochlearis, from the trochlea, or pulley, through which the tendon passes.

Fig. 5.



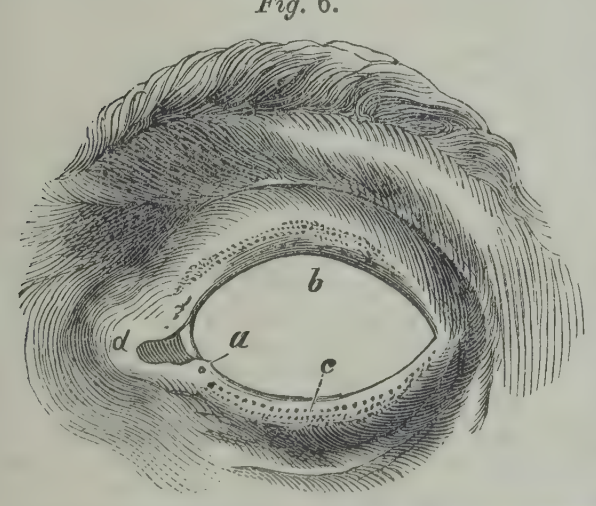
Lateral view of the Eyeball, seen from the outer side, with its muscles.

a, rectus superior; *b*, rectus inferior; *c*, rectus internus; *d*, rectus externus, arising by a double head (it is represented as cut off from *h*, its insertion into the eyeball, and turned aside to show the parts behind it); *e*, obliquus superior, a round and tapering muscle terminating in a round tendon, which passes through a pulley or loop (*k*), and is reflected under the flat tendon of the rectus superior, and, becoming flat, is inserted at (*m*) into the sclerotic; *f*, obliquus inferior coming round over the tendon of the rectus inferior from the front and inner edge of the orbit, near the inner corner of the eye, and inserted into the sclerotic opposite the insertion of the superior oblique; *g*, levator palpebræ superioris, ending in a flat tendon, which is inserted into (*l*) the crescentic tarsal cartilage of the upper lid; *o*, *n*, the optic nerve; *p*, the nerves of the 3rd, 5th, and 6th pair, which pass between the two heads of the rectus externus. The rest of their course is not shown.

The way in which these muscles act may be seen by an inspection of the accompanying diagram, in which however the relative size of the parts have been somewhat altered to make them more distinct.

Paralysis of the nerves which supply the muscles, and contraction of the muscles themselves, both produce squinting. This affection is now cured by the operation of dividing the affected muscle.

Fig. 6.



View of the left Eyebrow and Eyelids, showing their Tarsal Margins.

a, lower punctum lachrymale; *b*, tarsal edge of the upper lid; *c*, orifices of the ducts of the Meibomian glands (those on the upper lid are similar); *d*, caruncle, situated at the inner canthus, or corner of the eye.

The double line of points external to the Meibomian orifices marks the situation of the eyelashes, which are removed.

The textures which enter into the composition of the eyelids (*fig.* 6) are included between a soft external skin and a moist smooth internal surface, a continuation of the conjunctiva. The eyelids meet, when closed, by two narrow flat surfaces, accurately applied to each other, called their ciliary or tarsal margins. These epithets are respectively derived from the tarsi or thin concave and crescentic shells of smooth and elastic cartilage which give form to the lids, and firmness and outline to their opposed edges; and from the lashes, or cilia, which grow in several rows at the margins of both lids, from their extreme outward verge, and in the direction of the flat surfaces.

Immediately beneath the subcutaneous cellular tissue there is a broad layer of muscular fibres arranged elliptically round the transverse fissure of the eyelids. The office of this muscle, which is called the orbicularis, is to close the lids; and it is capable of acting under certain circumstances with great force. It is collected at the inner angle or canthus of the eye into a round short tendon, which is attached in that situation to the bone. Elsewhere it is connected with the skin, and aponeurotic expansions of the face and forehead.

Below the orbicularis, in the upper lid, is the broad tendon of the muscle which elevates the upper lid.

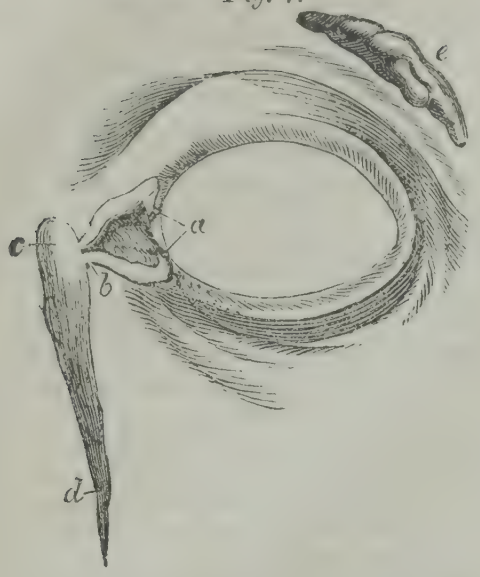
Between the tarsus of each eyelid and the conjunctiva are disposed numerous vertical rows of minute whitish grains, which appear through the semi-transparent mucous membrane, and occupy an elliptic space, taking both eyelids together, of about half an inch in width, exactly in front of the globe. These are called the Meibomian glands, from their discoverer. They secrete an unctuous matter which passes into tubes centrally placed in each row, and exudes from as many minute orifices on the ciliary margin of the eyelid. (*Fig.* 6, *c.*) There are about forty of these parallel clusters in the upper lid: in the lower there are not so many, nor are they individually so long. This secretion often collects in a sensible quantity upon the edges of the eyelids during sleep, especially when the glandular action is excited by slight inflammatory irritation of the part. The palpebral conjunctiva, already described, immediately covers these glandular corpuscles. The caruncle, a small red prominence at the inner angle of the eye (*fig.* 6, *d*), consists of a number of similar bodies.

At the upper and outer part of the interior of the eyelid are several minute orifices, generally seven in number, arranged in a half-circle, which lead into the secretory ducts of the lachrymal gland. (*Fig.* 7, *e.*) This is a white flattened lobulated body, of the size of a large bean, lodged in a depression just within the margin of the orbit, and covered externally by the orbicular muscle. The function of this gland is to secrete the tears, and is probably always going on, although not in a degree sufficient to be remarked, except in weeping, or when some foreign body or acrid vapour stimulates the surface of the eye, and by sympathy excites the gland to unusual secretion.

The approximation of the eyelids towards the nose in winking is one of several provisions by which offending particles or superfluous fluids are brought to the inner canthus of the eye in order to be protruded or absorbed. In this

R. A. N. M. S. MEDICAL LIBRARY
Accession No. 12,5
U.D.C No: 4-2-81

Fig. 7.



a, the two puncta leading into the lachrymal ducts; *b*, the common entrance of these ducts into the lachrymal sac; *c*, the head of the lachrymal sac; *d*, the narrow portion of the sac, or membranous lachrymal canal, passing downwards to the nose; *e*, the lachrymal gland.

situation there is a vacant space partly occupied by the caruncle, called the lacus lachrymalis (*fig.* 6, *d*); it is a sort of reservoir or rather sink for the tears. Above and below, at the entrance to this space where the ciliary margins terminate, there is a small prominence on the inner edge of both (*fig.* 6, *a*; 7, *a*), centrally punctured by small orifices. These are the puncta lachrymalia. They are the emunctories of the eye; and their function is to absorb the fluids presented to them, and convey them by two converging canals (*fig.* 7, *a*) to the lachrymal sac (*fig.* 7, *c*), which they enter by a common orifice (*fig.* 7, *b*). This is a membranous bag, about as large as a kidney bean, lodged in a groove in the lachrymal bone, behind the tendon of the orbicular muscle. The lachrymal sac entering a vertical channel in the bone at the end of the groove is narrowed into the lachrymal canal (*fig.* 7, *d*), and passes directly downwards into the inferior meatus or chamber of the nose, which it enters on the outer side by a slit in the mucous lining. It is not exactly understood in what way the puncta absorb, whether by capillary attraction or by some vital force of suction. The side of the lachrymal sac is connected with the tendon of the orbicularis, which may aid in producing the effect by suddenly drawing its membranous surfaces apart. We all know the effect of repeated winking when the eyes are filled with tears.

Comparative Anatomy of the Eye.—The eyes of insects and many other articulated animals often consist of myriads of simple eyes grouped in one compound organ. The eye of the lobster is said to contain at least 5000. Such organs are commonly placed one on each side of the head. The horny, rounded, naked, and transparent part seen externally represents the cornea. Its surface when viewed by the microscope displays as many hexagonal facettes as the organ contains simple eyes. Beneath each facette is applied the base of a minute transparent cone which constitutes the lens. These cones are arranged side by side with their acute angles directed inwards to the terminations of as many fibres of an optic nerve. A choroid pigment is spread beneath, and often separates the lenticular cones. Vestiges of the aqueous and vitreous humours are also frequently present. When the eyes are simple, as in the spiders, there are generally several, from two to twelve, placed on different parts of the head and thorax. The lens is of the usual spherical shape, hard and sparkling, and highly refractive. In fish and other aquatic animals the lens is dense, hard, and spherical, to make up in refractive power for the density of the medium through which light reaches the eye. On the other hand, the cornea is flat, and there is little aqueous humour. Such provisions would be of no value; for, as the refractive power of water is the same as that of aqueous humour, rays penetrating the surface, however shaped, would pass on in the direction of their entrance. Fish are unprovided with eyelids, and the eyeball has but little independent motion. There is a red gelatinous structure near the optic nerve between the layers of the choroid, the use of which is unknown. It is called the choroid gland. The ciliary body and processes are generally absent; but there is a rudiment in the eyes of fish of that part called the pecten in birds.

The eyeballs of quadrupeds and other mammalia resemble the human order in structure, and differ from it, but not essentially, in form.

EYE, in Horticulture, the name technically given to the bud of a plant.

EYE. [Suffolk.]

EYES, PROPAGATION BY. The power of propagating plants by any other means than seeds depends entirely on the presence of leaf-buds, or *Eyes*, as they are technically called by gardeners. A plant may in fact be regarded as a congeries of individuals, and each leaf-bud is an individual capable of maintaining an independent existence. Though this is generally true, the buds of all plants will not grow when removed from their parent stock. Many however admit of their buds being removed from one branch and placed upon another, which constitutes the process of budding. Others admit of a branch being removed and placed in the ground, when the leaf-buds upon it will develope, and the wood of the branch form roots. Such branches are called cuttings. A few plants admit of single buds being taken and planted in the earth, when they will grow and produce plants in the same manner as seeds. It must however be borne in mind in this case that the individual, and not the species, as is the case with seeds, is propagated. The plants which are most frequently propagated by eyes are the potato and the vine. It appears that, for plants to grow in this manner, the bud requires that a due supply of nutriment should be stored up in the branch or part of the stem to which it is attached. This is undoubtedly the case in the potato, where a large quantity of amylaceous matter is stored up in the tubers, so that a bud cannot be taken without carrying away fragments of its elementary secretions. Mr. Knight observed, with regard to the buds of the vine, that those grew with most rapidity and strength which were

in contact with the largest quantity of alburnum, which he regards as the nutritious matter of the young buds. The provision however of alimentary matter may be in some cases, as has been pointed out by Dr. Lindley, disadvantageous by promoting too great a development of stems and leaves. According to theory, the more nutritive matter there is for the eyes, the greater crop there will be; and thus it would seem that it would be more advantageous to plant whole potatoes than portions of the potato, or sets.

In propagating the vine by this means, an eye is taken with a small portion of the stem adhering to it, and is placed in earth with a bottom heat of 75° or 80°. It should be kept in a damp atmosphere, when it speedily shoots up into a branch, and at the same time establishes itself in the soil by the development of roots. In order to insure the success of this operation, it is necessary that the bud should be dormant at the time it is removed, and that a small piece of well-ripened wood should be separated with it.

EYLAU. [KÖNIGSBERG.]

EYRE. [COURTS.]

EZEKIEL, *the Book of the Prophet*, is a canonical book of the Old Testament, divided, in our English version, into forty-eight chapters, and placed next after Jeremiah's Book of Lamentations, and before the Book of Daniel. Ezekiel was partially contemporaneous with Jeremiah, and is one of the prophets called 'The Greater,' a distinction which relates to the comparative magnitude and importance of their books. He was a priest, the son of Buzi (i. 3), and, according to the account of his life ascribed (erroneously) to Epiphanius, he was born at a place called Saresa. In the first Babylonian captivity he was carried away by Nebuchadnezzar into Mesopotamia, with the kings Jeconiah and Jehoiachim, and all the principal inhabitants of Jerusalem, who were stationed at Tel-abib (iii. 15) and at other places on the river Chebar (i. 1, 3), the Chaboras of Ptolemy, which flows into the east side of the Euphrates at Carchemish, about 300 miles north-west of Babylon. He is stated to have commenced his prophesying in the fifth year of his captivity (i. 2), about B.C. 598, and to have continued it during more than twenty-two years, that is, until the fourteenth year after the destruction of Jerusalem by Nebuchadnezzar. The pseudo-Epiphanius says that Ezekiel, on account of his aversion to adopt the Chaldæan idolatry, was put to death by the Jewish prince or commander of the captives. Josephus speaks of two Books of Ezekiel, but commentators understand him to mean the present Book, divided at the end of chapter xxxix.; for the nine remaining chapters are distinctly different with regard both to subject and style. The first thirty-nine chapters are occupied with the prophet's highly poetic and impassioned announcement of God's wrath and vengeance against the rebellious idolatry, perverseness, and sensuality of the Jews, as well as against their enemies, the surrounding nations. All this portion is replete with dreadful pictures of the calamities of war—of ruin, desolation, death, and destruction—slaughter, pestilence, famine, and every imaginable state of misery; but in the nine chapters of the latter portion the prophet describes, in a more prosaic style, his visions of the new temple and city of Jerusalem.

EZRA, *the Book of*, is a canonical book of the Old Testament, placed next after the Second Book of Chronicles and before the Book of Nehemiah, and, in the English version, is divided into ten chapters. By Jews and Christians it has generally been attributed to the priest whose name it bears, chiefly because throughout chapters viii. and ix. the actions of Ezra are related in the first person. There are four Books of Ezra so called; namely, the canonical one bearing his name, the Book of Nehemiah, which by the ancient Jews and by the Greek and Roman churches is considered as the Second Book of Ezra, and two Books of Ezra, or Esdras, in the Apocrypha. The first of the two apocryphal books contains the substance of the canonical one, with many circumstantial additions, and in the Greek church it is read as canonical; but the second exhibits a more decided appearance of fiction, and by no church is regarded as a work of inspiration, though it is cited by several of the ancient fathers. The events recorded in the whole ten chapters of the canonical Book of Ezra embrace a period of ninety-one years, that is, from the edict of Cyrus issued in the first year of his reign, B.C. 536, for the return of the captive Jews to Jerusalem, to the termination of Ezra's government by the mission of Nehemiah to Jerusalem from Artaxerxes Longimanus, in the twentieth year of his reign, B.C. 445.

The two principal undertakings of Ezra were—1, the restoration of the Jewish law and ritual, according to the modes observed before the captivity; and, 2, the collection and rectification of the sacred scriptures. On account of these important services the Jews regarded him as a second Moses. It was commonly believed by the ancient fathers of the Christian church that all the sacred scriptures of the Jews were entirely destroyed by the King of Babylon, and that, on the return of the Jews from the Chaldæan captivity, these writings were wholly reproduced by a divine inspiration of Ezra. Dr. Prideaux however, in common with most other modern divines, rejects the opinions of the fathers respecting the restoration of the Scriptures by a new revelation to Ezra, observing that 'it would very much shock the faith of many should it be held that the sacred writings owe their present being to such a revival; it being obvious for sceptical persons to object that he who is said thus to have revived them forged the whole.' 'All,' he continues, that Ezra did was this: 'he got together as many copies of the sacred writings as he could, and out of them all he set forth a corrected edition, in which he took care of the following particulars:—1. He corrected all the errors introduced into these copies by the negligence or mistakes of transcribers; for, by comparing them, he found out the true reading, and set all to rights. 2. He collected together all the books of which the sacred scriptures did then consist, disposed them in proper order, and settled the canon of Scripture up to that time.'

F is a labio-dental aspirate, bearing the same relation to the other labio-dental aspirate V which the letters called *tenues*, *p*, *k*, *t*, bear to the *mediæ*, *b*, *g*, *d*. It occupies the sixth place in the English as in the Latin alphabet.

The letter *F* is interchangeable with the other aspirates *ch* or *h* and *th*, and also with the lip-letters *p* and *b*.

1. *F* in Latin corresponds to *h* in Spanish, as Latin *formoso*, beautiful; Spanish *hermosa;* Latin *fugere*, fly; Spanish *huir*.

2. *F* in Latin corresponds to *th* in Greek, as Latin *fera*, a wild beast; Greek θηρ.

3. *F* in Latin corresponds to *b* in German and English, as *frang-ere*, *brech-en*, to break; *frater*, *bruder*, *brother*. [See B.]

4. *F* in English and German to *p* in Latin, as *pelli*, *fell*, *fell* (comp. *fell*monger); *ped*, *fuss*, *foot; pug-na-re*, *fechten*, *to fight*, &c.

F is also the symbol of the digamma or vau, which likewise occupied the sixth place in the ancient Greek alphabet, for, while *epsilon* is employed as the numerical symbol for *five*, the next letter, as that alphabet is now arranged, is the representative of *seven*. Moreover, this position of the digamma will correspond precisely with that of *vau* or *waf* of the Hebrew, and of *f* in the Latin alphabet, two letters of kindred power and form. The letter still exists in many inscriptions. With regard to the power of the letter, it is now the general and well-established opinion that it is equivalent to our own *w*. [Digamma.]

F, in Music [Diatonic; Gamut; Scale]. This letter is also an abbreviation of the Italian word *forte*, strong, or loud. The double F signifies the superlative of *forte—fortissimo*.

FABA. [Bean; Viciæ.]

FABACEÆ. [Leguminosæ.]

FABBRO'NI, A'NGELO, born at Florence in 1732, studied at Rome, where he resided some time. In 1766 he published the first volume of his Latin biographies of the learned men of modern Italy: 'Vitæ Italorum Doctrina Illustrium,' a work which he afterwards extended to twenty volumes, 8vo. He returned to Florence in 1767, where the Grand-Duke Leopold made him Prefect of the University of Pisa. Fabbroni subsequently travelled through Germany, France, and England, and, on his return to Tuscany in 1773, he devoted himself to literary pursuits. He was the editor of the 'Giornale Pisano,' a literary magazine, which enjoyed considerable reputation in the latter part of the eighteenth century, and he published an interesting history of the University of Pisa, 'Historia Academiæ Pisanæ,' 3 vols. 4to., Pisa, 1791. Fabbroni died at Pisa in 1803. He was the author of various Italian works, and had the just reputation of being one of the best Latin scholars and Italian writers in the eighteenth century.

FA'BIUS MA'XIMUS. The Fabii were a powerful gens or patrician house of ancient Rome, which became subdivided into several families or branches distinguished by their respective cognomina, such as Fabii Maximi, Fabii Ambusti, Fabii Vibulani. They were of Sabine origin. Cæso Fabius, being Quæstor with L. Valerius, impeached Spurius Cassius, 486 B.C., and had him executed. For seven consecutive years from that time, one of the two annual consulships was filled by three brothers Fabii in rotation. Niebuhr has particularly investigated this period of Roman history. ('History of Rome,' vol. ii., 'The Seven Consulships of the Fabii.') In B.C. 479, the whole house of the Fabii proposed to leave Rome and settle on the borders of the territory of Veii, in order to undertake the war against the Veientes. They left Rome in a body, mustering 306 patricians, besides their families, clients, and freedmen, and encamped on the banks of the Cremera in sight of Veii. There they fortified themselves, and maintained for nearly two years a harassing warfare against the Veientes and other people of Etruria. At last in one of their predatory incursions they fell into an ambuscade, and were all killed. (Livy, ii. 48, 50; and Niebuhr's 'History on the Veientine War.') One only of the house, Quintus Fabius Vibulanus, who had remained at Rome, escaped, and became the parent stock of all the subsequent Fabii. He was repeatedly consul, and was afterwards one of the decemviri with Appius Claudius for two consecutive years. M. Fabius Ambustus was consul in the year 393 of Rome, and again several times after. He fought against the Hernici and the Tarquinians, and left several sons, one of whom, Q. Fabius Maximus Rullianus, attacked and defeated the Samnites (429 of Rome) in the absence and against the orders of his commanding officer, the dictator Papirius, who would have brought him to punishment for disobedience, but was prevented by the interposition of the soldiers and the people. This Fabius was five times consul, and dictator twice. His son Q. Fabius Gurges was thrice consul, and was the grandfather of Quintus Fabius Maximus Verrucosus, who in his first consulate triumphed over the Ligurians. After the Thrasymenian defeat he was named prodictator by the unanimous voice of the people, and was intrusted with the salvation of the Republic. The system which he adopted to check the advance of Hannibal was by avoiding a general engagement and harassing the enemy.

This mode of warfare, which was new to the Romans, acquired for Fabius the name of Cunctator or 'temporizer,' and was censured by the

young, the rash, and the ignorant. Minucius, who shared with Fabius the command of the army, having imprudently engaged Hannibal, was saved from destruction by the dictator. In the following year however, 536 of Rome, Fabius being recalled to Rome, the command of the army was intrusted to the consul Terentius Varro, who rushed imprudently to battle, when the defeat of Cannæ made manifest the wisdom of the dictator's caution. Fabius was made consul in the next year, and again kept Hannibal in check. In 543 of Rome, being consul for the fifth time, he re-took Tarentum by stratagem, after which he narrowly escaped being caught himself in a snare by Hannibal near Metapontum. (Livy, xxvii. 15, 16.) Fabius died some time after at a very advanced age. His son, called likewise Quintus Fabius Maximus, who had also been consul, died before him. His grandson Quintus Fabius Maximus Servilianus, being proconsul, fought against Viriatus in Spain, and concluded with him an honourable peace. (Livy, 'Epitome,' 54.) He was afterwards consul several times, and also censor. He wrote Annals, which are quoted by Macrobius. ('Saturn.' i. 16.) His brother by adoption Quintus Fabius Maximus Æmilianus, the son of Paulus Æmilius (Livy, xlv. 41), was consul in 609 of Rome, and was the father of Fabius, called Allobrógicus, who subdued the Allobroges, and the people of Southern Gaul, which he reduced into a Roman province. Quintus Fabius Maximus, a grandson of Fabius Maximus Servilianus, served in Spain under Julius Cæsar, and was made consul in the year 709 of Rome. Panvinius and others have reckoned that during a period of about five centuries, from the time of the first Fabius, who is mentioned as consul, to the reign of Tiberius, 48 consulships, 7 dictatorships, 8 censorships, 7 augurships, besides the offices of master of the horse and military tribune with consular power, were filled by individuals of the Fabian house.

FA'BIUS PICTOR, the historian, was descended from Marcus Fabius Ambustus, the consul. Caius Fabius, one of the sons of Ambustus, was called Pictor, because about B.C. 304 he painted the temple of the goddess of health, which painting existed till the reign of Claudius, when the temple was burnt. (Pliny, xxxv. c. 4.) The surname of Pictor was continued to his children, one of whom, Caius Fabius Pictor, was consul with Ogulnius Gallus, B.C. 271, and was the father of the historian. Quintus Fabius Pictor, the historian, lived in the time of the second Punic War. He compiled a history of his country from the annals of the pontiffs and from popular tradition, which commenced with the arrival of Æneas in Italy, and was continued to the age of the historian. He is spoken of with praise by Livy, who borrowed largely from him, and by Cicero, Pliny, Appian, and others. Polybius however censures his partiality for the Romans, and his unfairness towards the Carthaginians, in his account of the second Punic War. The fragments of Pictor have been collected by Krause, *Vitæ et Fragmenta Vet. Hist. Romanorum*, Berlin, 1833.

FABLE, *Fábula* in Latin, in its general sense means a fictitious narrative, but it also means more particularly a species of didactic composition, consisting of a short fictitious tale, which inculcates a moral truth or precept. As such it is sometimes divided into two sorts, the parable and the apologue. [APOLOGUE.] The parable, according to this division, narrates some incident, which, although it may not have happened exactly as the narrator supposes, yet could have happened, there being nothing impossible or improbable in it. Of this description are many of the parables contained in the New Testament. The second species of moral fable, called apologue, relates facts which are evidently untrue, and cannot have happened; such as animals, or even inanimate things speaking, but which serve as comparisons for the actions of men. Most of the fables which are called Æsopian are apologues, although some are of the parable kind; for example that of Æsop and the villain who threw a stone at him. (Phædrus, iii. 5.)

The oldest collection of fables in any European language is in Greek prose: the fables are attributed to Æsop. [ÆSOP.] Babrius made a metrical version of Æsopian fables. [BABRIUS.] The fables called the fables of Bidpai are of eastern origin. [BIDPAI.] As to those of Lokman see LOKMAN.

Among the Latins, Phædrus, who lived under Tiberius, is the most celebrated: he professes to have taken his subjects from Æsop. Among modern original writers of fables, La Fontaine ranks above all writers of this class. Among the English, Gay and Moore have written fables. The Germans have had Lessing, Gellert, and others; and the Spaniards have Yriarte and Samaniego. Among the Italians, Firenzuola, Crudeli, Baldi, Capaccio, in the sixteenth and seventeenth centuries, wrote chiefly translations or paraphrases from the Greek and Latin fabulists. In the eighteenth century Pignotti, a native of Tuscany, wrote original fables in verse, which were published at Pisa in 1782, and have been often reprinted since. Bertola also wrote fables (Pavia, 1788), with an essay on fables. Luigi Fiacchi published, under the name of 'Clasio,' a collection of fables (Florence, 1807).

FABOI'DEA, Mr. Bowerbank's generic title for many seed-vessels in the London Clay of the Isle of Sheppey.

FABRETTI, RAFFAELE, born at Urbino in 1619, was secretary of Pope Alexander VIII., and præfect of the papal archives in the castle St. Angelo under Innocent XII. Fabretti spent most of his time in examining the ruins which are scattered about Rome and its neighbourhood. His chief work is a collection of Latin inscriptions, entitled, 'Inscriptionum Antiquarum Explicatio,' fol., 1699. He also wrote a valuable treatise on the column of Trajan, and another on the Aquaeducts of Ancient Rome, 4to., 1680, which was reprinted with notes and additions in 1788. Fabretti died at Rome in January 1700.

FABRIANO. [MACERATA.]

FABRIA'NO, FRANCESCO DI GENTILE DA, commonly called Gentile da Fabriano, was born at Fabriano, in the Marc of Ancona, about 1370.

Gentile executed many works in fresco and à tempera. He painted in 1423 a Madonna for the Cathedral of Orvieto, and in the same year, at Florence, an admirable picture of the Adoration of the Kings, for the sacristy of Santa Trinità, which is now in the gallery of the academy at Florence, and is one of its choicest pieces. Gentile received the patrician's toga at Venice for a painting in the council chamber of the naval victory of the Venetians over the fleet of Frederic Barbarossa in 1177: it fell to pieces in the 16th century through damp. At Rome he painted some of the decorations of the church of San Giovanni in Laterano, ordered by Pope Martin V.; and a fresco of the Madonna and child, with St. Benedict and St. Joseph, over the tomb of Cardinal Adimari, in the church of Santa Maria Nuova; all of which have now perished. His colouring and execution were excellent for his period, and he was one of the most meritorious artists of his time. Gentile taught Jacopo Bellini at Venice, and that painter's son Gentile was Fabriano's namesake. He died about 1450.

FABRI'CIUS, CAIUS, surnamed Luscinus, was consul for the first time in 283 B.C., when he triumphed over the Boii and the Etruscans. After the defeat of the Romans under the consul Lævinus by Pyrrhus (B.C. 281), Fabricius was sent by the senate to the king to treat for the ransom of the prisoners, or, according to others, to propose terms of peace. Pyrrhus is said to have endeavoured to bribe him by large offers, which Fabricius, though poor, rejected with scorn, to the great admiration of the king. Fabricius, being again consul (B.C. 279), was sent against Pyrrhus, who was then encamped near Tarentum. The physician to the king is said to have come secretly to the Roman camp, and to have proposed to Fabricius to poison his master for a bribe, at which the consul, indignant, put him in fetters and sent him back to Pyrrhus. Fabricius, having defeated the Samnites, Lucanians, and Bruttii, who had joined Pyrrhus against Rome, had the honour of a triumph. Pyrrhus, afterwards returning to Italy, was finally defeated and driven away by M. Curius Dentatus (B.C. 276). Two years after, Fabricius was consul for the third time. Several instances are related of the simplicity of the manners of Fabricius, which are conformable to what is recorded of the austerity of Roman life previous to the Punic Wars. Fabricius died poor, and the senate made provision for his daughters. (Plutarch, *Life of Pyrrhus*; Livy, *Epitome*, xiii., xiv.; Justinus.)

FABRI'CIUS, JOANNES ALBERTUS, born at Leipzig in 1667, early distinguished himself by his proficiency in classical literature, and his penetration and judgment, assisted by an excellent memory. Having finished his studies at Leipzig, he went to Hamburg, where J. F. Meyer appointed him his librarian. He was afterwards appointed professor in the college of Hamburg, where he remained to the end of his life. He was the author of many laborious works, the principal of which are:—'Bibliotheca Græca,' 14 vols. 4to., Hamburg, 1705-28, of which a new edition, with considerable improvements, was published by Harles, Hamburg, 1790-1809; and 'Bibliotheca Latina,' 3 vols. 4to., 1708-21, of which Ernesti published a new and much improved edition at Leipzig, 1773. The 'Bibliotheca Latina' is inferior in research and copiousness to the 'Bibliotheca Græca.' The bare catalogue of the works of Fabricius shows his prodigious industry and learning: it exceeds one hundred, some of them works of great labour. Fabricius died at Hamburg in April 1736, in his 69th year. His private character was as praiseworthy as his learning was great. He was modest, hospitable to strangers who came to visit him, indefatigable in the duties of his professorship, and yet he found time for the compilation of the numerous works already mentioned. Reimarus, his son-in-law, wrote his biography in Latin, 8vo., 1732.

FABRI'CIUS, JOHANN CHRIST, was born in the year 1742, at Tundern, in the duchy of Schleswig. He studied under Linnæus, and afterwards enjoyed perhaps a more brilliant reputation than any other pupil of that great naturalist. Early in his career he resolved to make an especial study of entomology, and the first results of his investigations were made known in his 'Systema Entomologiæ' (1775), where he proposed a new arrangement of the insect tribe, the novelty of which consisted in choosing for his divisions the modifications observable in the parts of the mouth.

Fabricius subsequently published numerous other works of still greater importance, lists of which will be found in Watt's 'Bibliotheca Britannica,' and in the 'Manuel du Libraire, par Brunet, fils. Neither of them is however complete, and the best list will be found in the 'Penny Cyclopædia.' Possessing a great knowledge of languages, Fabricius travelled through the northern and middle states of Europe, collecting new materials and frequenting the various museums, from which he described all those insects of which descriptions had not hitherto been published.

Fabricius was of an amiable disposition, and is said to have been reproached by a fellow professor for his extreme modesty, which his friend urged would retard his advancement. Although so well versed in entomology, Fabricius was not a stranger to other branches of zoology; he was also versed in botany and mineralogy. He died of dropsy, in his 65th year, much regretted by all naturalists.

FABRI'ZIO, GERO'NIMO, commonly called *Fabricius ab Aquapendente*, was born in 1537 at Acquapendente in Italy, a city near Orvieto, in the States of the Church. His parents, although poor, contrived to furnish him with the means of obtaining an excellent education at Padua. He became a pupil of Fallopius at an early age, and speedily attracted the attention and good-will of his instructor. He thus secured many peculiar advantages, of which he availed himself so well, that, having taken his degrees in medicine with much credit, he was appointed on the death of Fallopius in 1562 to succeed him in the direction of the anatomical studies of the university, and three years later to the full emoluments of the professorship.

His reputation as a teacher drew students from all parts of Europe, till at length the theatre of

anatomy, built originally by himself, became so crowded, that the Venetian senate provided him, in 1593, with another of ample dimensions at the public expense, and at the same time added largely to his salary, and granted him many exclusive privileges and titles of honour. The fame and wealth he derived from his practice as a surgeon were even more than equal to what he enjoyed as an anatomist, and, after upwards of fifty years of uninterrupted and well-deserved prosperity, he retired from public life the possessor of an enormous fortune and the object of universal esteem. Yet he does not appear to have found the contentment he sought in his retirement. His latter years were embittered by domestic dissensions and the unfeeling conduct of those who expected to become his heirs; and he died in 1619, at the age of eighty-two, not without the suspicion of poison, at his country-seat on the banks of the Brenta, still known as the Montagnuola d'Acquapendente.

Fabricius was the tutor of William Harvey, whose discovery of the circulation of the blood was suggested, according to his own statement, by the remarks of Fabricius on the valvular structure of the veins.

He published many tracts on anatomy and physiology, which were collected in one volume folio, and republished, with a biographical memoir of the author, by Albinus at Leyden in 1738. The best edition of his surgical works, the twenty-fifth, was printed, also in one folio volume, at Padua in 1666. His writings are all in Latin, and display a considerable knowledge of the literature, general and medical, of that language and of the Greek.

FABROT, or FABROTUS, CHARLES-ANNIBAL, a jurist, was born at Aix in Provence, in 1580 or 1581. With an interval of a short residence in Paris in 1617, Fabrot appears to have taught law in the University of Aix from the year 1609 to 1637, when he went to Paris to print his edition of the Greek version, by Theophilus, of the 'Institutes' of Justinian. His great work was an edition of the 'Basilica.' [BASILICA.] In 1638 he edited at Paris the works of Cujacius, in 10 volumes folio, a well-known edition, but not well provided with means of reference. The labour connected with this work is said to have occasioned the death of the editor: he died at Paris, Jan. 16, 1659. (Niceron, *Mémoires des Hommes Illustres*, xxix. 353–363.)

FABYAN, ROBERT, the historian, was descended of a respectable family of Essex. Bishop Tanner says he was born in London. We have no dates of his early life, but he is known to have belonged, as a citizen, to the Company of Drapers; that he was alderman of the ward of Farringdon Without; and that in 1493 he served the office of sheriff. In 1502, on the plea of poverty, he resigned the alderman's gown, not willing to take the mayoralty, though he was probably opulent at this time, but seems to have considered that the expenses of the chief magistracy were too great to be sustained by a man who had a numerous family. He ordered the figures, as may be seen in his will, of sixteen children, in brass, to be placed upon his monument. Stowe, in his 'Survey of London' (edit. 1603, p. 198), gives the English part of the epitaph on Fabyan's tomb, from the church of St. Michael, Cornhill, and says he died in 1511, adding that his monument was gone. Bale places Fabyan's death on Feb. 28, 1512.

There have been printed five editions of Fabyan's 'Chronicle.' The first was printed by Pynson, in 1516, and is of great rarity, in a perfect state. In subsequent editions alterations and omissions were made. In the 5th edition, 4to., London, 1811, by Sir Henry Ellis, all the editions as well as a manuscript of the second part were compared. The first edition had no regular title; the latest is called 'The New Chronicles of England and France, in two parts, by Robert Fabyan, named by himself the Concordance of Histories.'

FAÇADE, a French term of modern introduction into the English language. It expresses the face or front view of an edifice, and is often used in speaking of architectural buildings, as the façade of the Louvre, or the façade of St. Peter's at Rome.

FACCIOLA'TI, JA'COPO, was born at Toriggia on the Euganean hills, in the province of Padua, in 1682. He studied first in the College of Este, and was afterwards placed by Cardinal Barbarigo, bishop of Padua, in the clerical seminary of that city, where he completed his studies and was admitted into holy orders. He was then appointed teacher and afterwards præfect or chief superior of the same establishment. Among other works, he published improved editions of the 'Lexicon' of Schrevelius, of the 'Thesaurus Ciceronianus' of Nizolius, and of the vocabulary of seven languages known by the name of 'Calepino,' 2 vols. fol., 1731. In this last undertaking he was greatly assisted by his pupil, Egidio Forcellini, although he was not willing to acknowledge the obligation. J. B. Gallizioli made a new edition of the 'Calepino,' 2 vols. fol., Venice, 1778, and added many oriental and other words. It was in the course of his joint labours with Facciolati that Forcellini conceived the plan of a totally new Latin Dictionary, which, after more than thirty years' assiduous application, he brought to light under the title of 'Totius Latinitatis Lexicon,' 4 vols. fol., Padua, 1771. This work has superseded all other Latin Dictionaries. Forcellini, more generous than Facciolati, acknowledged in the title-page of his work that its production was in a great measure due to the advice and instruction of his deceased master. A new edition of Forcellini's Lexicon has been lately published by the Abate Furlanetto of the same institution.

In 1722 Facciolati was appointed professor of logic in the University of Padua. He died at Padua, in 1769, in his 88th year. He left numerous works, mostly in Latin. His Latin Epistles and Orations are admired for the purity of their style.

FACTOR, a name given to any algebraical expression considered as a part of a product. Thus a and $a+x$ are the factors of the product $a(a+x)$, or $a^2+a\,x$.

FACTOR is a mercantile agent, who buys and

sells the goods of others, and transacts their business on commission. He is intrusted with the management and disposal of the goods, and he buys and sells in his own name, in which particulars consists the main difference between factors and brokers. [BROKER.]

The chief part of the foreign trade of a country is carried on through the medium of factors, who generally reside at a distance from the merchants or manufacturers who employ them. The common duty of a factor is to receive consignments of goods, to sell them, and to make remittances either in money, bills, or purchased goods, in return; and he is paid by a commission upon the money which passes through his hands. It is usual for a factor to make advances upon the goods consigned to him, for which, and for his commission, he has a general lien upon all the property of his employer which may at any time be in his hands.

It is the duty of a factor to keep the goods with which he is intrusted free from injury, to keep a clear account of his dealings, and at proper times to transmit it to his employer, with information of all the transactions and liabilities which he has entered into and incurred in the course of his employment, by which his principal can be affected; also to send him advice of all bills accepted or drawn upon his credit, and generally to act with fidelity to him, strictly observing the letter or the spirit of his instructions, and, where they are silent, following the ordinary prudent course of other merchants who deal in like commodities, as to time and mode of sale, credit, &c. A factor is not answerable in all cases for the safety of the goods in his care: it is sufficient if he does all that a man of ordinary prudence would do in the care of his own goods. He is bound, upon receiving notice from his principal, to insure the goods consigned to him (provided he has effects of his principal in his hands of sufficient amount to defray the premium), to discharge the duties payable upon the exportation or importation of the goods, to cause the regular and necessary entries to be made at the custom-house, and do all other things necessary for the safety and preservation of the goods.

Where general and unlimited orders are given to a factor, he may buy and sell on the best conditions that he can. It was a rule of law, previously to the passing of the Stat. 6 Geo. IV. c. 94, that a factor had only authority to sell the goods of his principal, and that if he pledged them the principal might recover them from the pledgee. But, by virtue of this statute, the pledgee of a factor, when he lends his money without notice that the factor is not the owner of the goods, is enabled to retain them for his security; and, even when he has such notice, the lender has a lien upon the goods to the same amount as the factor was entitled to.

When a sale is made by a factor, the principal may maintain an action against the buyer for the price, and may by notice direct him not to pay the money to the factor, which notice the buyer is bound to attend to. A purchase by a factor for his principal renders the latter liable to the vendor, though a payment to the factor is a sufficient discharge, unless notice to the contrary has been given by the principal. And this holds good in both cases, even when the name of the principal is not disclosed at the time of the contract, but is afterwards discovered; though, where a factor conceals the name of his principal and buys or sells apparently on his own account, the buyer or seller may treat the factor as the principal so far as any other liability of the factor may exist to him; as where a factor sells goods in his own name, being indebted to the purchaser, the latter may set off the amount of debt due to him from the factor against the price of the goods.

There is another description of factor, who acts under what is called a del credere commission, where, for an additional per-centage he engages for the solvency of the purchasers of the goods consigned to him. [AGENT.] In this case, the factor stands in the relation of a surety for the persons with whom he deals on account of the employer, and he is liable to his employer only in case of their default. *Del credere* is an Italian mercantile phrase, of the same signification as the English word guarantee, and the Scotch warrandice.

When goods are consigned to joint factors, they are answerable for one another for the whole.

The principal may recover against his factor by action for the neglect of his duty, or disobedience to his instructions, if loss occur thereby, as if he purchases goods at a limited price, and fraudulently sells them again for his own profit. If a factor, without the orders of his principal, exports goods prohibited by the customs' laws, and the same are seized, the loss is the factor's; and if he pays money without the direction of his employer, or sells his goods at an undervalue, or exports goods of an improper quality, he is answerable for the damage. And if a factor exports goods of a different quality or kind from those he was directed to purchase, or sends them to a place other than that to which he was ordered to send them, the merchant may refuse to accept them, and may recover from the factor any damage he has sustained in consequence of his neglect. The rights and liabilities of merchants and factors are governed by the law of the place in which they are domiciled, and any contract which may be made by either of them must be governed by the law of the place where it is made; and these rules are acted upon by the courts of justice of every nation. Thus, since the passing of the above-mentioned statute, a foreign merchant cannot recover his goods from the pledgee of his factor in England, though he may be totally ignorant of the change which has taken place in the law. And again, if a bill be accepted in Leghorn by an Englishman, and the drawer fails, and the acceptor has not sufficient effects of the drawer in his hands at the time of acceptance, the acceptance becomes void by the law of Leghorn, and the acceptor is discharged from all liability, though by the law of England he would be bound.

(2 Strange's *Reports*, 733; Beawe's *Lex Merc.*; Bell's *Commentaries;* Paley, *Principal and Agent;* Russell, *On the Laws relating to Factors and Brokers*, London, 1844.)

FACTORY. The name of factory was formerly given only to establishments of merchants and factors resident in foreign countries, who were governed by certain regulations adopted for their mutual support and assistance against the undue encroachments or interference of the governments of the countries in which they resided. In modern times these factories have, in a great measure, ceased to exist, because of the greater degree of security which merchants feel as regards both the justice of those governments and the protection, when needed, of their own country.

The Venetians, Genoese, Portuguese, Dutch, French, and English have all had establishments of the nature of factories. In China the Portuguese established a factory at Macao, and the English at Canton. In most instances, factories have at first obtained the privilege of trading, and afterwards procured for the precinct assigned to them some exemption from the jurisdiction of the native courts. In this state of things the supreme government of the country whose subjects have established the factory prepare laws for its control and administration, and treat it in fact as if it were its dependency, though the sovereignty of the native government is undisputed. ('Government of Dependencies,' by G. C. Lewis, pp. 93 and 169.)

In its usual acceptation, the word factory has now a different meaning. [FACTORY.]

FACTORY. The word Factory, according to the Factory Act (7 Vict. c. 15), means all buildings wherein steam, water, or any other mechanical power is used to work any machinery employed in the manufacture of cotton, wool, hair, silk, flax, hemp, jute, or tow.

What is called the Factory System owes its origin to the invention and skill of Arkwright; and it is probable that but for the invention of spinning machinery, and the consequent necessary aggregation of large numbers of workmen in cotton-mills, the name would never have been thus applied. It is in the cotton-mills that the factory system has been brought to its highest state of perfection.

The legislature has interfered to prevent children in factories being tasked beyond their strength, to the permanent injury of their constitutions. This abuse was the more to be apprehended, because a large proportion of the children engaged in cotton-spinning are not directly employed by the masters, but are under the control of the spinners, a highly paid class of workmen, whose earnings depend greatly upon the length of time during which they can keep their young assistants at work. A parliamentary committee sat for the investigation of this subject in 1832, and subsequently a commission was issued by the crown for ascertaining, by examinations at the factories themselves, the kind and degree of abuses that prevailed, and for suggesting the proper remedies. In consequence of these inquiries, an act was passed in 1833 (3 & 4 Wm. IV. c. 103) for regulating factories. This act has been amended by 7 Vict. c. 15.

On January 1, 1846, a new act came into operation, which brought print-works, or calico-printing establishments within the operation of the factory regulations. By the terms of another act, passed in 1847, 'no children' or 'young persons' are to work in a factory more than 11 hours a day, from July 1, 1847; nor more than 10 hours a day from May 1, 1848. The same provisions are made in respect to all women of whatever age; so that at the present time the work-hours of women, boys, and girls, are limited: those of men unlimited by any enactment.

The United Kingdom is divided into four factory districts, presided over by four inspectors and several sub-inspectors. Each inspector presents a report half yearly to the Home Secretary, respecting the state of the factories within his district. These reports occasionally give such information as will show the number of factories and work-people. In 1845, Mr. Horner, whose district is very nearly coextensive with the county of Lancashire, gave the following as the state of his district in that year:—

	Mills.	Workers under 18.	Workers 18 & above.	Power Looms.
Cotton Mills	1,724	69,155	128,305	138,717
Woollen do.	241	5,456	6,485	3,237
Flax do.	71	2,255	3,336	„
Silk do.	32	3,121	3,324	995
	2,068	79,987	141,450	142,949

The great strength of the woollen and worsted trades lay in another district, concerning which similar returns were not made.

At the present time (Sept. 1848) the mills and works within the limits of the town of Manchester, subject to the factory laws, are as follow:—

	Mills.	Hands.
Cotton . .	96	26,809
Silk . . .	8	2850
Worsted . .	3	169
Small Wares .	17	1752
Print Works .	4	1172
Dye Works .	23	1874

FAE'NZA, the ancient *Faventia*, an episcopal town in the Papal province of Ravenna, is situated in a well-cultivated plain watered by the Lamone, 20 miles S.W. from Ravenna. The Zanelli Canal connects Faenza with the Pò di Primaro, or southernmost branch of the Po. Faenza is a well-built town, with about 20,000 inhabitants. The streets are regular; there is a fine market-place surrounded by arcades, many palaces, churches rich in paintings, convents, an hospital, a lunatic asylum, a fine bridge on the Lamone, a theatre, and a Lyceum. There are several manufactories of a kind of coloured and glazed earthenware, which in called *Majolica* in Italy, and *Faience* in France, and which, before the manufacture of china or porcelain became established in Europe, was in greater repute than it is at present. There are also manufactories for spinning and weaving silk, and some paper mills. Faventia was anciently a town of the Boii, and afterwards a municipium under the Romans. It was near Faventia that Sulla defeated the consul Carbo and drove him out of Italy.

FAGOPYRUM, a genus of plants belonging to the natural order *Polygoneæ*. There is but one

British species of this plant, the *F. esculentum.* This is the *Polygonum fagopyrum* of Smith, and known as the common Buck-Wheat.

FA'GUS, the *Beech,* is a genus of corylaceous Exogens. There are several species, some of which are mere bushes; the only one known in Europe of any importance is the *Fagus sylvatica,* or common Beech, a native of various parts of the world in temperate climates. It is one of the most handsome of our trees on dry sandy or chalky situations; its mast, or nuts, not only furnish food for swine, but yield by pressure after pounding a useful oil; and its timber, although not of good quality where strength and durability are required, is very extensively used for a variety of purposes, particularly for boat-building, work under water, carving, and chair-making; it is also one of the best kinds of wood for fuel.

FAHLORE, *Grey Copper Ore.* Of this there are two varieties, the *arsenical* and the *antimonial.* The former occurs crystallized and massive; the primary form of the crystal is a cube. The massive variety is amorphous and granular. Specific gravity, 5. It consists chiefly of arsenic, copper, iron, and sulphur. The antimonial variety occurs crystallized in modified tetrahedrons. Colour dark lead-gray, approaching to iron-black. It consists chiefly of antimony, copper, sulphur, iron, and zinc.

FAHLUN. [Falun.]

FAHLUNITE, or *Tricklasite,* is a mineral which occurs crystallized and massive. Primary form of the crystal a right rhombic prism, but it usually occurs in regular hexagonal prisms. Colour yellowish, greenish, and blackish brown. Nearly or quite opaque. Specific gravity, 2.6. It consists chiefly of silica, alumina, oxide of iron, and magnesia.

FAHRENHEIT, GABRIEL DANIEL, was born at Danzig, near the end of the 17th century, but the precise year of his birth is unknown. His taste inclined strongly to scientific pursuits, and having travelled through different parts of Germany in order to acquire information respecting the subjects of his studies, he came to Holland, and established himself at Amsterdam as a maker of philosophical instruments. He is chiefly distinguished for the invention of that particular scale which he applied to thermometers [Thermometer], and which has ever since been generally in use in this country.

Fahrenheit was elected a Fellow of the Royal Society of London in 1724, and wrote some papers in the 'Philosophical Transactions' for that year. He died in 1740.

FAINTING. [Syncope.]

FAIOUM, a province of Egypt to the west of the Libyan ridge which bounds the valley of the Nile on the west. About 12 miles N.W. of Benisouef there is a depression in the ridge about 6 miles in length, which leads to the plain of Faïoum. This plain is of a circular form, about 40 miles from E. to W. and about 30 from N. to S. The northern and north-western part of it is occupied by the lake called Birket el Keroun. A range of naked rocks bounds the lake to the north and joins towards the east the Libyan ridge which skirts the valley of the Nile. To the west and south the plain is bounded by lower hills which divide it from the Libyan desert. It forms in fact a basin with only one opening or outlet to the east towards the Nile. The Bahr Yussouf, or great canal, which runs parallel to the Nile and skirts the Libyan ridge, on arriving at the gap above mentioned, at a village called Howarah Illahoun, turns to the west, passing under a bridge of three arches, through which the water flows and forms a fall of about three feet at low water. It then runs along the valley, and on reaching the entrance of the Faïoum, at the village of Howarah el Soghair, a wide cut branches off from it to the right, running first north and then north-west, and passing by Tamieh meets the north-east extremity of the lake. About two miles below Howarah el Soghair another deep ravine opens to the south, and then, turning south-west, passes by Nezleh, and enters the south-west part of the lake. Between these two branches the cultivated part of the Faïoum is contained. The main stream continues its course westward towards the middle of the plain and the town of Medinet el Faïoum, the capital of the province. All the part west of Nezleh is arid and sandy, and inhabited only by a few nomad Arabs. It is calculated that the land susceptible of cultivation in the Faïoum is about 450 square miles. The cultivated part is superior in fertility to every other province of Egypt; and this advantage it owes to the system of irrigation by small rills which are fed from the canals above mentioned. In addition to corn, cotton, and the other cultivated plants, it produces in abundance apricots, figs, grapes, and olives, and other fruit trees, which thrive here better than in the valley of the Nile. A vast quantity of roses also grow in the Faïoum, and this district is celebrated for making rose-water, which is sold at Cairo and all over Egypt.

South of the Faïoum there is an opening through the hills into a smaller circular plain with a small lake called Birket el Garaq, which has one or two hamlets on its banks. A small stream from the Bahr Yussouf runs into it. The road-track of the caravans to the smaller oasis passes through this place.

(*Description de l'Egypte;* Browne; Belzoni; and Wilkinson's *Topography of Thebes.*)

FAIR, an annual or fixed meeting of buyers and sellers; from the Latin *feriæ,* holidays. Fairs in ancient times were generally held on holidays.

Anciently, before any flourishing towns were established, and the necessaries or ornaments of life, from the convenience of communication and the increase of provincial towns, could be procured in various places, goods and commodities of every kind were chiefly sold at fairs; to which, as to one universal mart, the people resorted periodically, and supplied most of their wants for the ensuing year. Warton, in his 'History of English Poetry,' has given us a curious account of that of St. Giles's hill or down, near Winchester. It was instituted by William the Conqueror, at first for three days, which were afterwards extended to sixteen. Its jurisdiction extended seven miles round,

and comprehended even Southampton, then a capital trading town; and all merchants who sold wares within that circuit, unless at the fair, forfeited them to the bishop. As late as 1512, as we learn from the Northumberland Household-book, fairs still continued to be the principal marts for purchasing necessaries in large quantities, which are now supplied by the numerous trading towns.

The fairs of Frankfort-on-the-Main and Leipzig are still pre-eminent in Europe. A very large part of the book-trade of Germany is centred in the Easter fair at Leipzig.

The fair of Nischnei Novgorod, in Russia, between the river Oka and the Volga, is the largest at the present day: 200,000 visitors are said to attend it, and commodities to the amount of 4,000,000*l.* sterling to be disposed of. There is also a singular fair held at Berbera, on the coast of Adel, in Eastern Africa. Throughout nearly the whole of the year the place is abandoned to the hyena and the jackal, and the huts are left open; but, as the period of the fair approaches, caravans of camels, horses, mules, asses, and troops of warriors continue to arrive, and in a short time the desert is animated by the presence of many thousands of persons, who, having transacted their business, disperse, and the place resumes its desolate solitude.

FAIRFAX, EDWARD, was the second son of Sir Thomas Fairfax, of Denton, in Yorkshire. The date of his birth is unknown; but, as his translation of Tasso's 'Jerusalem Delivered' was published in 1600, we may suppose it was some time in the reign of Queen Elizabeth. We learn from his writings that he was neither 'a superstitious Papist nor a fantastic Puritan;' but farther particulars of his life there are none. He is supposed to have died about the year 1632.

Fairfax is now known only for his translation of Tasso's 'Jerusalem Delivered,' which is executed in a manner which makes it wonderful how the frigid, jingling, and affected version by Hoole ever survived its birth. The measure which he chose for his work was the eight-line stanza, which is that of the original Italian. The verses are much more harmonious than those of Hoole, the diction is more simple, and the English more pure. The last edition forms 2 vols. of the series of Knight's 'Monthly Volume.'

FAIRFAX, SIR THOMAS, afterwards Lord Fairfax, son of Ferdinando, Lord Fairfax, was born at Denton, near Leeds. He went to St. John's College, Cambridge; but, being inclined to military employment, as soon as he left college, he enlisted in the army of Lord Vere, and served in Holland. When he returned to England, he married Anne, the fourth daughter of that peer, who, like her father, was a zealous Presbyterian. In 1642, when the civil wars broke out, Fairfax accepted a commission under his father, who was general of the parliamentary forces in the north. He soon distinguished himself. He raised the siege of Nantwich, in Cheshire, defeated the forces under Colonel Bellasis, governor of York, proceeded into Northumberland, and thus enabled the Scots to march southwards, and in conjunction with them

fought the memorable battle of Marston Moor (July 2, 1644). Before Helmsley Castle, which he afterwards (September) besieged, he received a wound in his shoulder that caused his life to be despaired of. When the Earl of Essex ceased to be parliamentary general, Fairfax was appointed his successor (January 1644–5), and Cromwell his lieutenant-general. The decisive battle of Naseby was fought June 14, after which Fairfax possessed himself of Bath, Bristol, and other important posts in Somersetshire. He thence went into Cornwall, and entirely dispersed the forces of the king. When he returned to London, in November, he was publicly thanked for his services, and received from the parliament a jewel of great value set with diamonds, together with a considerable grant of money. The payment of the 200,000*l.* to the Scottish army, in consideration of which they delivered up the king, was intrusted to Fairfax, who marched northward for this purpose. The discontents of the army, however, fostered by Cromwell and Ireton, were beyond his control, and though he saw that the Independents were forming a party distinct from the Presbyterians, he had not the resolution to resign his command. He remained the tool of Cromwell, following his counsels, until the army had become master both of the parliament and the kingdom.

In 1647 he was made Constable of the Tower; and in the following year, at his father's death, he inherited his titles and estates. In December he marched to London, menaced the parliament, and quartered himself in the palace at Whitehall. He was named one of the king's judges, but refused to act; and he was voted one of the new council of state (February 1648–9), but refused to subscribe the test. He continued in command of the army until June 1650, when, upon the Scots declaring for the king, he declined marching against them, and consequently resigned his commission. He now retired to his house at Nun Appleton, in Yorkshire, which for some years he made his principal residence. He left it (in 1659) to assist General Monk against Lambert's forces. In January 1659–60, he made himself master of York. In the February following he was elected one of the members for the county of York, and formed one of the committee appointed to promote the return and restoration of Charles II. In November 1671 he was seized with an illness which terminated in his death. He left issue two daughters: Mary, married to the Duke of Buckingham; and Elizabeth, of whom we have no account.

(Clarendon's *Rebellion;* Whitelock's *Memorials;* Rushworth's *Collections; Biog. Brit.*)

FAIRIES, a small sort of imaginary spirits of both sexes in human shape, who are fabled to haunt houses in companies, to reward cleanliness, to dance and revel in meadows in the night-time, and to play a thousand freakish pranks. Both sexes are represented generally as clothed in green, and certain circular appearances occasionally seen in pastures and on heaths are supposed to be the traces of their tiny feet, which remain visible on the grass for a long time after their dances: these are still called fairy rings or circles.

Bourne, in his 'Antiquitates Vulgares,' supposes the superstition relating to fairies to have been conveyed down to us by tradition from the Lamiæ, or ancient sorceresses; others have deduced them from the Lares and Larvæ of the Romans. The most general conjecture, however, is, that these imaginary people are of oriental origin. The reader who would look further into fairy mythology may consult Sir Walter Scott's 'Essay on the Fairy Superstition,' in the 'Minstrelsy of the Scottish Border;' and Keightley's 'Fairy Mythology,' 2 vols. 8vo., 1828.

FAITHORNE, WILLIAM, was born in London, but in what year is not known. He was instructed in engraving by Mr. Peake, afterwards Sir R. Peake, painter and printseller. He fought under his master on the side of Charles I. during the civil war, and was taken prisoner with him; but was liberated, and permitted to go to France. He returned about 1650, opened a print-shop in the Strand, near Temple Bar, and prosecuted his art at the same time. About 1680 he gave up his shop, and removed to Printing-House Yard, Blackfriars. He died in 1691, and was buried in St. Anne's Blackfriars. Walpole has given a considerable list of Faithorne's prints, the greater part of which are portraits, many of them of distinguished excellence, and of very interesting personages. (Walpole, *Catalogue of Engravings*, &c.)

FAKENHAM. [Norfolk.]

FAKI'R an Arabic word meaning poor, which is applied to the ascetics of several parts of the eastern world. In this sense it is synonymous with the Persian word *Derwish*. The work fakir is chiefly used in Hindustan.

FALAISE. [Calvados.]

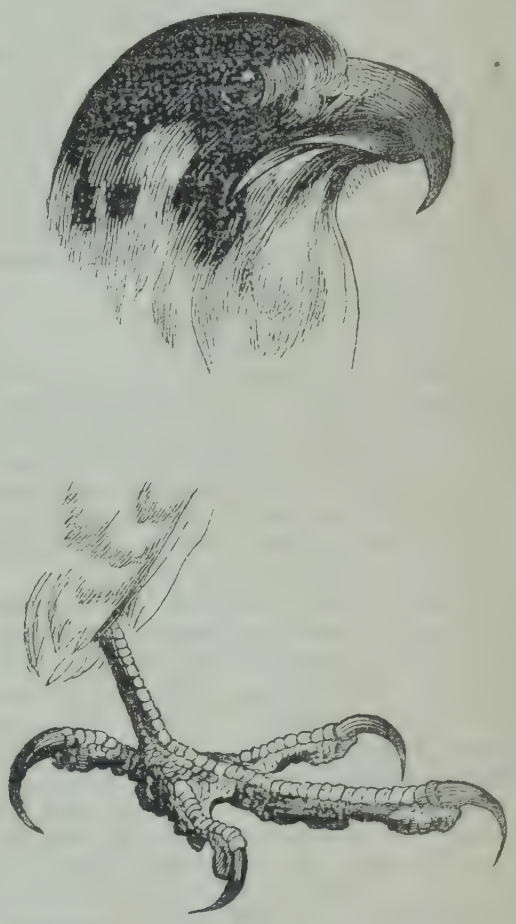
FALCON. [Falconidæ.]

FALCONER, WILLIAM, was born about the year 1730. When young, he served on board a merchantman, and was afterwards second mate of a vessel in the Levant trade, which was shipwrecked on the coast of Attica, himself with two others being the only survivors. This event formed the groundwork of 'The Shipwreck,' which poem he published in 1762. The notice which the poem received enabled him to enter the navy as midshipman in the Royal George. After some other appointments, he became purser to the Aurora frigate, and was lost in her during the outward voyage to India, in the winter of 1769.

Falconer was the author of a 'Nautical Dictionary' of considerable merit, as well as of some minor poems; but his chief claim to reputation is from 'The Shipwreck,' the merit of which arises from the vividness of description which pervades the work and the facility shown in introducing nautical language.

FALCONET, ETIENNE, was born at Paris in 1716, of a family originally from Savoy. He studied sculpture under Lemoyne, whom he soon surpassed. He executed several groups and statues, which are at Paris, and in 1766 he accepted the invitation of Catherine II. to repair to Petersburg, in order to execute the colossal statue of Peter the Great, which he completed, and which is perhaps the finest specimen of a colossal equestrian statue existing. Falconet returned to Paris in 1778. In May 1783, he had a paralytic stroke, which he survived several years, and died in January 1791. His writings were published under the title, 'Œuvres Complètes de Falconet,' 3 vols. 8vo., Paris, 1808, to which is prefixed an account of his life.

FALCONIDÆ, Leach's name for a family of *Raptorial Birds*, or birds of prey (*Raptores* of Illigor). In this family the destructive power is at its maximum. We find in the birds composing it natural instruments for striking, trussing, and rending their prey, combined with a power of flight and strength of limbs equivalent to the necessities of the case, whether the prey be aerial or terrestrial. Of these natural weapons, the head and foot of the Peregrine Falcon afford an apt illustration.



Head and Foot of Peregrine Falcon.

The bill is stout, hard, hooked, with the upper mandible often toothed and furnished at the base with a cere; the toes are large and strong and armed with powerful hooked claws, which, though not retractile as in feline quadrupeds [Felidæ], are nevertheless capable of being elevated at pleasure, so that their sharp points may be kept unworn and unblunted. From this circumstance the claws of Falcons, when sitting on stones or large branches of trees, have often a cramped appearance. The power of flight is very great; the pectoral muscles are extremely voluminous, and the keel of the sternum is singularly deep; the shoulders are kept wide apart, and supported by strong clavicles, and a *furcula*, or merrythought,

of great breadth and stoutness and of a boldly arched form. The wings are ample, generally long, and the quill-feathers firm and rigid; the tail is broad, and its feathers resemble in character the quill feathers of the wings. So material is the perfection of feather in the genus *Falco*, that, when any of those of the wing or tail are broken, the falconer finds it necessary to repair, or 'ympe' them, and keeps pinion and tail feathers accurately numbered for that purpose. (See Sir John Sebright's 'Observations on Hawking.') In the less typical forms of the *Falconidæ*, as the *Buzzards* and *Harriers*, we find the machinery of flight less vigorously constructed; the gradations are numerous—the sternum decreases in size, the keel in depth, the clavicles and furcula become more slight, the plumage is more soft and downy, and the feathers of the neck are often loose and ruffled. In accordance with this declension, there is a deterioration of the instruments of destruction; the beak and talons are feebler, and there is less boldness of disposition; they feed upon mice, reptiles, small or nestling birds, and insects.

With respect to the organs of digestion in the *Falconidæ*, Mr. Yarrell observes that the œsophagus offers nothing peculiar beyond that of other birds not possessing the power of minutely dividing their food. It is plicated lengthways, allowing great extension, and its separation from the stomach is marked by a zone of gastric glands. The same author mentions an opportunity which occurred to him of observing the castings or pellets of some eagles which had been occasionally fed with dead pigeons. These castings showed that the vegetable food, such as pease, wheat, and barley, which had been swallowed by the eagles in the crops of the pigeons, remained entire, but somewhat enlarged and softened by heat and moisture. In these cases no part of the bones remained.

The intestines of the *Falconidæ* are in general short and large, but Mr. Yarrell remarks that the *Osprey* is an exception to this rule, and that to the thin membranous stomach of this bird there is attached an intestinal canal which measures 10 feet 8 inches in length, and in some parts scarcely exceeds a crow-quill in thickness. The osprey feeds on fish, and it is remarkable that in the otter and the seal, both fish-eaters, the intestines are extremely long, and equal in size throughout. The *cæca* in the *Falconidæ* are very short.

Of all the senses, that of sight is the most acute. In no genus of birds are the powers of vision more wonderful than in the falcons. Elevating themselves, as they occasionally do, into the highest regions, it is necessary that they should perceive objects at very different distances, and in various directions; added to which, the rapidity of their flight renders extreme keenness of eye essential.

The eyes of birds are much larger than those of quadrupeds, and, besides being defended by a *membrana nictitans*, exhibit two other peculiarities: the one is the *marsupium*, a delicate membrane arising at the bottom of the eye, and terminating at or near the edge of the crystalline lens; the other is a ring of thin bony plates enveloped by the sclerotic coat, and by means of this ring

acted upon by delicate muscular fibres the eye becomes a self-adjusting telescope. [Birds.] This bony ring is convex externally (concave in owls), and consists in the Golden Eagle of 15 plates, in the White-Tailed Eagle of 14. (See Mr. Yarrell's paper 'On the Anatomy of Birds of Prey,' in 'Zool. Journ.,' vol. iii.)

From the time of Aristotle down to the present day the Falconidæ have engaged the attention of zoologists, and various and different have been the views entertained respecting the groups and genera which this family contains. Belon, Gesner, and Aldrovandus made attempts at system. Willughby divides his *diurnal birds of prey* into eagles, vultures, long-winged hawks, short-winged hawks, buzzards, shrikes, and birds of paradise. Ray, in his Synopsis, follows Willughby. Brisson, Linnæus, Pennant, Lacépède, Dumeril, Meyer, Cuvier, Vieillot, Temminck, Vigors, and Swainson, have each their respective mode of arrangement. To give an outline of the systems proposed by all these writers would be here inadmissible: a selection only is within our power, and, as the arrangement of Mr. Vigors has gained ground in our country, we shall briefly follow out his views:—

Falconidæ (Leach).

Head plumose, beak strong, hooked, with a cere at the base; nostrils lateral, more or less rounded, open, and situated in the cere; external toes especially connected with the middle toes; claws strong, very sharp, much incurved, and retractile. The females, as a rule, exceed the males in size.

1. Sub-family *Aquilina*.

Beak strong, hooked at the apex only; fourth quill the longest.

Long-Winged Eagles.

Genus *Ibycter*, Vieillot.—Beak convex above; lower mandible notched at the apex and subacute; cheeks, throat, and crop featherless; claws acute.

Example.—*Falco* (*Ibycter*) *aquilinus*. Gmelin. Locality, South America.

Genus *Daptrius*, Vieillot.—Beak convex above; lower mandible angular beneath; notched at the apex, obtuse; cere with scattered hairs; orbits, throat, and crop featherless; claws acute.

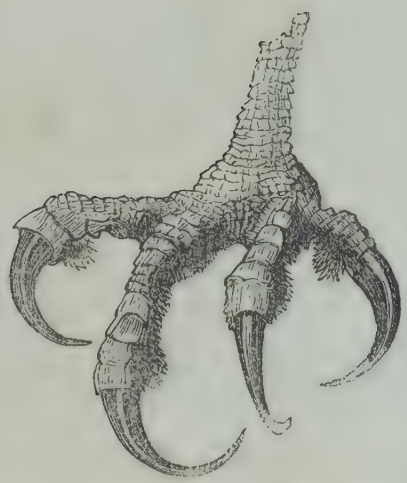
Example.—*Daptrius ater*. Locality, South America.

Genus *Polýborus*, Vieillot.—Beak compressed above; lower mandible entire and obtuse; cere covered with hairs; cheeks and throat featherless; crop, woolly.

Example.—*Polyborus Braziliensis*, or Brazilian Caracara Eagle. Locality, South America. Habits vulturine; carrion, reptiles, insects, and small quadrupeds, as well as birds, constituting the food. (See Mr. Darwin's account in 'Voyages of the Adventure and Beagle.')

Genus *Pandion*, Savigny.—Beak rounded above; cere hispid; nostrils lunulated and membranaceous on the upper margin; tarsi naked; acrotarsia covered with rigid reticulated scales; toes free, the external toe versatile; claws rounded underneath; second quill longest.

Example.—*Pandion haliœetus*, the Osprey, or Bald Buzzard. [Bald Buzzard.]



Head and Foot of *Pandion haliœetus*.

Osprey (*Pandion haliœus*).

Genus *Haliœetus*.—Beak convex above; nostrils lunulated, transverse; cere sub-hispid; tarsi semiplumed; acrotarsia scutellated; toes free, the external toe versatile; claws unequal.

Examples.—*Haliœtus leucocéphalus*, the Bald or White-Headed Eagle of North America; *H. albicilla*, the Cinereous Eagle, White-Tailed Eagle, or Sea Eagle, of the old world.

To other kinds of prey, as aquatic birds, lambs, hares, &c., these eagles add fish, as their favourite food; these they often pounce upon whilst swimming near the surface of the water, but they also

obtain their booty in a less honest way. They watch the industrious Osprey or Fish-Hawk, as he sails over the water on expanded wings; they mark him descend from his elevation, plunging like a shot into the water, whence scattering the spray he emerges, bearing a fish in his talons; they then commence their attack, and after many aerial manœuvres force him to drop the prize, which they catch before it reaches the water. [Bald Buzzard.] Audubon gives a most animated account of the destruction of the wild swan by the white-headed eagle, to which we refer our readers. This ferocious bird is the symbol of the United States of America. See Wilson's 'American Ornithology,' and also Yarrell's 'British Birds.' Eggs generally three in number. Several other species of fishing-eagles belong to this genus, as *H. Washingtonii*, described by Audubon, *H. ponticerianus* of India, *H. aguia* of Chili, *H. vocifer* of the Cape of Good Hope, &c.

Genus *Circœetus*, Vieillot.—Beak convex above; nostrils lunulate, transverse; cere sub-hispid; tarsi elongated, naked; acrotarsia reticulated; toes short, the external toe connected with the middle one at the base; claws short, unequal.

Example.—*Circœetus brachydactylus*, the *Jean le Blanc* of the European continent. Locality, the great fir forests of the eastern parts of the north of Europe. Reptiles constitute its chief food.

Genus *Aquila*.—Beak sub-angular above; nostrils rounded; cere sub-hispid; tarsi plumed to the toes.

Example.—*Aquila chrysaetos*, the Golden Eagle; in its young state, the Ring-Tailed Eagle of the older ornithologists.

Golden Eagle (*Aquila chrysaetos*).

This magnificent bird is widely spread, inhabiting Europe, Asia, North Africa, and North America. It inhabits the great forests of many districts, but is more partial to bold mountain ranges. It is common in Sweden, the Tyrol, Franconia, Suabia, Germany, Russia, &c. In

France, it frequents the forest of Fontainebleau, the mountains of Auvergne, and the chain of the Pyrenees. We have seen specimens from India, and Colonel Sykes enumerates it among the birds of the Dukhun (Deccan). It is noticed by Wilson, Audubon, and Dr. Richardson. The latter ('Fauna Boreali-Americana') mentions it with a query as breeding in the recesses of the subalpine country which skirts the Rocky Mountains. Wilson says it breeds on precipitous rocks within the arctic regions. This bird, says Dr. Richardson, 'is held by the aborigines of America, as it is by almost every other people, to be an emblem of might and courage, and the young Indian warrior glories in his eagle plumes as the most honourable ornament with which he can adorn himself. Its feathers are attached to the calumets, or smoking pipes, used by the Indians in the celebration of their solemn festivals, which has obtained for it the name of the Calumet Eagle. Indeed, so highly are these ornaments prized, that a warrior will often exchange a valuable horse for the tail-feathers of a single eagle.' Formerly this eagle was common in our island, and bred in the peak of Derbyshire, in Cumberland, Westmorland, and other rocky and mountain districts; at present however it is almost exclusively confined to the mountain ranges of Scotland and its western and northern islands, where it commits sad ravages among lambs, young pigs, hares, rabbits, and grouse. The highland chieftains wear an eagle's feather by way of distinction in the bonnet.

In Ireland, the Golden Eagle inhabits the mountains in several counties, as Donegal, Antrim, Kerry, &c.; and Mr. Thompson, in the 'Magazine of Botany and Zoology,' vol. ii. p. 43, relates many very interesting anecdotes respecting it, which tend to prove that it is by no means uncommon. One or two pairs breed annually on the island of Achil. The nest, composed of sticks, heath, &c., is generally placed on the ledge of some inaccessible precipice, sometimes on the branches of a tree springing from the face of a tall cliff, on the wildest part of the mountains. The eggs are two in number, of a grayish white clouded with spots of reddish brown. The young are plentifully supplied with food. Bechstein mentions that, in one eyrie in Germany, the remains of 300 ducks and 40 hares were found; but, as these were only brought as food to the young, we must, in order to estimate the destructiveness of this species, add the number of fawns, roebucks, sheep, lambs, &c., killed by the old birds which were not brought to their domicile.

The Golden Eagle measures about three feet in length, and about eight in the expanse of the wings. The female is a little larger. (See Montagu's 'Ornithol. Dict.,' Willughby's 'Ornithology,' Bewick's 'Birds,' Selby's 'Illust. of British Ornithology,' Yarrell's 'British Birds,' and the 'Mus. of Anim. Nat.,' vol. i. p. 255.)

Genus *Hæmatornis* (Vigors).—Beak rather strong; upper mandible straight at the base, very much curved at the apex; nostrils oval, placed obliquely in the cere; wings short, sub-rounded; the first quill rather short, the fourth and fifth nearly equal and longest; tarsi rather weak, sub-elongated, rough, reticulated with scales; toes rather short; claws strong; tail rather long and somewhat rounded.

Examples.—*Hæmatornis undulatus, H. Bacha, H. holospilus.* Locality, India, on the Himalaya Mountains, Africa, Manilla.

Short-Winged Eagles.

Genus *Harpyia.*—Beak above convex, very strong; upper mandible slightly toothed; nostrils semilunar, transverse; tarsi moderately long, extremely stout, feathered at the base; toes and claws terribly powerful; acrotarsia scutellated.

Example.—*Harpyia destructor,* the '*Grande Harpie d'Amérique*' of the French.

Harpy Eagle (*Harpyia destructor*).

This tremendous eagle is a native of Mexico, Guiana, and other parts of the hotter regions of America. It is stated to be a solitary bird, frequenting the thickest forests, where it makes the sloths its prey. It also destroys fawns and other quadrupeds. Sonnini observed it sitting motionless, and uttering no cry, in a high tree on the banks of the Orapu. Hernandez asserts that it will attack the most fierce beasts, and even man himself; and he farther states that it may be trained like a hawk to pursue game. Linnæus gives the bird credit for strength sufficient to split a man's skull with a single blow. No doubt the bird is tremendously powerful. Jaquin's specimen was found dead in the ship that was conveying it to Europe, and its death was with some probability attributed to the sailors, whose monkeys the eagle had destroyed. When these animals gambolled too near its cage, they were siezed by its talons, and devoured with almost all their bones, but not their skin, which the bird invariably stripped off. The Harpy which was obtained by Mr. Hesketh, consul at Maranham, near the mouth of the river Amazon, and brought to England by Major Sabine, is said to have destroyed

and eaten a king of the vultures (*Sarcoramphus papa*), on its passage to England. After its arrival a cat was put into its cage, and the eagle with one blow of its immense foot broke its back. This noble specimen was first sent to the gardens of the Horticultural Society at Chiswick, and thence transferred to those of the Zoological Society.

The Harpy Eagle soars not aloft like the golden eagle, but threads the mazes of the forests, intent upon the sloth clinging to the branch, or the monkeys gambolling amidst the foliage; its wings are not formed for exalted flight, and its general plumage is lax and owl-like. We suspect that it sails on noiseless pinions, striking its prey unawares. In strength of talon it is unequalled.

Description (adult).—Head with thick downy plumage, of a light slaty gray. Crest arising from the back part, of numerous broad feathers increasing in length towards the middle line of the head, and thus assuming a rounded form, of a dull black, with the exception of a slight margin of gray on the tips of the longer feathers, and a more extensive tinge of the same colour on those of the sides. This crest is slightly raised above the level of the feathers of the back of the neck when the bird is quiet, but is capable of being elevated at right angles with them upon any sudden excitement. In this state, to an observer placed in front of the bird, the middle feathers of the crest are rarely visible, on account of their being inserted much lower down than the lateral ones; while the latter, converging on either side, form, as it were, two lax ear-like processes. Below the crest, the whole of the back and wings, together with a broad collar round the fore part of the neck, black, each of the feathers of the back terminating in a narrow transverse somewhat lighter streak. Under surface, from the breast backwards, pure white. Plumage of the legs white with blackish transverse bars. Tail with four transverse black bands, of about equal breadth with the four alternating whitish or ash-coloured spaces; the tip light ash. (Bennett.)

Genus *Morphnus* (Cuvier). — Beak convex above; nostrils elliptical; tarsi elevated, rather slender; acrotarsia scutellated; toes powerful but rather short; claws acute.

Example.—*Morphnus urubitinga*, the Brazilian Eagle. Locality, Guiana and Brazil, where it frequents marshy or inundated localities, sweeping off its prey from the land or water.

A section of this genus is characterized by the tarsi being feathered to the toes.

Example. — *Morphnus occipitalis*, with the back of the head beautifully crested. Locality, Africa.

Genus *Cymindis* (Cuvier). — Beak convex above; nostrils nearly closed, rimiform; tarsi short, scutellated or reticulated,

Examples.—*Cymindis hamatus*, with the anterior edge of the tarsi scutellated. Locality, Brazil.—*Cymindis Cayennensis*, with the tarsi anteriorly reticulated. Locality, Guiana.

Genus *Asturina* (Vieillot). — Beak convex above; nostrils lunulate; tarsi short, somewhat slender; claws long, very acute.

Example.—*Asturina cinerea*. Locality, Guiana. (Note. The position of the last three genera is very doubtful. This species are not true eagles, but rather buzzard eagles, or harrier eagles. Indeed Mr. Vigors assigned to them this situation only provisionally, until their habits and manners were more definitely ascertained.)

2. Sub-family *Accipitrina* (Hawks).

Beak short, hooked from the base; wings short, fourth quill longest. These are birds of great courage; their flight is low, but rapid; they do not tower like falcons, but clutch their prey as they sweep along. Several species were used in falconry; the Goshawk, for example, was flown at pheasants and hares.

Genus *Dædalion* (Savigny).—Beak short; tarsi moderate; acrotarsia reticulated.

Example.—*Dædalion cachinnans*. Locality, South America.

Genus *Astur* (Bechstein).—Beak short; nostrils sub-oval; tarsi moderate; acrotarsia scutellated.

Example. — *Astur palumbarius*, the Goshawk.

Goshawk (*Astur palumbarius*).

A full-grown female measures 24 inches in length; the male is about a fourth smaller. The bird was anciently highly valued by the falconer. It flies low, and pursues its prey in a line after it, or in the manner called 'raking,' by falconers. If the game takes refuge it will sit patiently on a tree or stone till it moves, or till some other prey is accessible. It preys on hares, rabbits, pigeons, pheasants, grouse, and partridges. The female was generally flown by falconers at fur, and the male at feather; but the female was also trained to take the largest winged game, the male being principally flown at partridges. Turbervile says, 'You shall not neede to shew any other game to a goshawk for her first entring than a partridge, because in learning to flee the partridge they prove most excellent; and the first year you shall do best to flee them to the field, and not to the covert, for so will they learn to hold out (and not to turn tail) in the middst of their flight; and when they be mewed

hawks, you may make them do what you will, and understand you, that you shall not need to take such pain nor to use such art in making of a goshawk which is taken a brancher, as with a *Nyasse*, for she will always know of her self what to do.' ('The Book of Falconrie.') Nest on a high tree, in the outskirts of the forest; rarely found in the interior, except in those parts which are open and free from timber. Eggs three or four, frequently hatched in the middle of May. Mr. Yarrell says that the small number of eggs which he has seen were uniform in size and colour, $2\frac{3}{16}$ths inches in length by $1\frac{11}{16}$th in breadth, of a pale blueish white, without any spots or streaks. The Goshawk inhabits Denmark, Norway, Sweden, Siberia, Russia, and Chinese Tartary. (Müller, Linnæus, Pennant.) Very common in France, Germany, Russia, and Switzerland; more rare in Holland. (Temminck.) Rare in the south of England. Mr. Yarrell says, 'The few that are used for hawking are obtained from the continent. Colonel Thornton, who kept them constantly in Yorkshire, procured some of his specimens from Scotland. Dr. Moore, in his catalogue of the birds of Devonshire, says that it is found occasionally on Dartmoor, but I can find no record of its appearance farther west in England, nor any notice of it in Ireland.'

North America produces a closely allied species; it was met with by Dr. Richardson in the Hudson's Bay Territories, and is described and figured in the 'Fauna Boreali-Americana.'

Genus *Accipiter*. — Tarsi elongated, smooth; acrotarsia scutellated, the suture scarcely to be discerned.

Example.—*Accipiter fringillarius*, the Sparrow-Hawk. This species, small as it is, is fierce and intrepid, and makes havoc among chickens, young partridges, and small birds generally. It was used in falconry, and is the best of all hawks for landrails. It haunts wooded districts. Locality, Europe generally, and Asia.

Sparrow-Hawk (*Accipiter fringillarius*).

Genus *Harpagus*, Vigors (*Bidens*, Spix).—Beak short; upper mandible strongly bidentated, lower with a double notch; tarsi moderate; acrotarsia scutellated; third and fourth quills longest, equal.

Example. — *Harpagus bidentatus*. Locality, Brazil and Guiana.

Genus *Gampsonyx* (Vigors). — Beak short; mandibles entire; nostrils rounded; wings short, second quill longest; tail moderate, equal; feet moderate; tarsi reticulated; acrotarsia feathered to the middle.

Example.—*Gampsonyx Swainsonii*. Locality, Brazil.

3. Sub-family *Falconina* (Falcons).

Beak short, hooked from the base; wings long; second quill longest.

Genus *Hierax* (Vigors).—Beak short; upper mandible strongly bidentated; lower simply notched; tarsi moderate; acrotarsia scutellated.

Example.—*Hierax cærulescens*. Length, $6\frac{1}{2}$ inches. Locality, Java.

Genus *Falco*.—Beak short; upper mandible strongly toothed; lower notched; acrotarsia reticulated; second quill longest; first and second deeply notched internally near the apex.

Example.—*Falco peregrinus*, the Peregrine Falcon.

Peregrine Falcon (*Falco peregrinus*).

The female Peregrine Falcon measures about 18 inches in length, the male about 15 inches. The food of this daring falcon consists of waterfowl, grouse, and other birds, rabbits, hares, &c. It was highly esteemed by the falconer in the olden time.

'In the language of falconry,' writes Yarrell, 'the female Peregrine is exclusively called the Falcon, and on account of her greater size, power, and courage, is usually flown at herons and ducks; the male Peregrine, being smaller, sometimes one-third less than the female, is called the Tercel, Tiercel, and Tiercelet, and is more frequently flown at partridges, and sometimes at magpies. Young Peregrines of the year, on account of the red tinge of their plumage, are called, the female a Red Falcon, and the male a Red Tiercel, to distinguish them from other birds, which are called Haggards or Intermewed Hawks. The Lanner of Pennant is a young female Peregrine, at which age it bears some resemblance to the true Lanner, *Falco lanarius* of authors—a true falcon also, but much more rare than the Peregrine, and which

probably has never been killed in this country. Mr. Gould says he was unable to find a specimen in any collection here, either public or private, at the time he was desirous of figuring this species in his 'Birds of Europe.' The true Lanner is only found in the south and south-eastern parts of Europe. The king of France, Louis XVI., had Lanners sent annually from Malta; but they were brought from the eastern countries. It exceeds the Peregrine Falcon in size, being intermediate between that and the Jerfalcon; it was much esteemed for flying at the kite, with which the Peregrine is hardly able to contend.' The name of Lanner is confined to the female: the male is called a Lanneret, on account of his smaller size. ('British Birds.') Our limits will not allow us to enter into any account of the mode of flying it at herons, &c., flying at the brook or at the river, as it was anciently called; and we must refer the reader to Tubervile, among the old writers, and to Sir John Sebright as the best of the modern authors on the subject. (See Sebright's 'Observations on Hawking.') Nest, on high rocks. In Britain, Mr. Yarrell states that the Peregrine builds on various parts of the coast, more frequently in Scotland than in England. The eggs are from two to four in number, about two inches long by one inch and eight lines in breadth, mottled all over with pale reddish brown. Mr. Selby notices their eyrie at St. Abb's Head. It was from this locality that the late Mr. Baird of Newbyth usually obtained his cast of hawks, for each of which he gave the persons who undertook the peril of climbing the rock one guinea. Other localities for the nest in Britain are the cliffs between Fresh-Water Gate and the lighthouse near the Needles, Isle of Wight; Devonshire and Cornwall, where it is called Cliff Hawk; Holyhead and the Great Orme's Head (Yarrell); rocky coast of Caernarvonshire (Pennant); rocky situations inland and marine in Ireland (Thompson, quoted by Yarrell); Vale of Moffat, in Dumfriesshire; the Bass Rock, and the Isle of May in the Forth (Sir Wm. Jardine).

Localities.—All the mountainous countries of Europe, particularly on rocks; very rare in champaign countries; never found in marshy districts; abundant in Germany and France; sufficiently common in England and Holland; rare in Switzerland. (Temminck.) Shetland Isles, where it breeds; Denmark, Sweden, Norway, Lapland, and Greenland. (Yarrell.) Uralian and Siberian mountains. (Pennant.) Dr. Richardson, who describes an old male from Melville Peninsula, lat 68° N., says ('Fauna Boreali-Americana'), 'The Peregrine being a rare bird in the wooded districts of the Fur Countries where the trading posts are established, I did not procure a specimen on the late expeditions; but I have frequently seen it whilst on the march across the Barren Grounds. Of the two specimens figured by Edwards, one was from Hudson's Bay and the other was caught off the entrance of Hudson's Straits. Captain Parry likewise brought home several male and female specimens from Melville Peninsula, some of which are preserved in the British Museum. It is a summer visitor of the northern parts of America, and frequents the coasts of Hudson's Bay and the Arctic Sea, with the Barren Grounds, but is very seldom seen in the interior. It preys habitually on the long-tailed ducks (*Anas glacialis*), which breed in great numbers in the Arctic regions, arriving in June and departing in September. Captain Parry observed it, in his second voyage, following flocks of the snow-bunting on the coast of Greenland, near Cape Farewell. It frequents the shores of New Jersey and Pennsylvania in the winter, and is celebrated there for the havoc it makes among the water-fowl. Mr. Ord states that the ducks which are struck by it are lacerated from the neck to the rump; it gives the blow in passing, and returns to pick up its bird.' Port Famine, Straits of Magalhaens. (Captain King.) New Holland. (Vigors and Horsfield.) Cape of Good Hope. (Dr. A. Smith.) Prince Bonaparte notes it as rare, and as seen only in winter near Rome, and as rare and casual near Philadelphia. Dr. Smith ('South African Museum,' No. 94) says that the bird so numbered, though it does not exhibit exactly the plumage of the Peregrine Hawk of Europe, yet approaches it so closely, that it might be considered as attempting too great a refinement to class it as a different species.

As other examples of the genus *Falco*, we may mention the Jerfalcon (*F. Islandicus*), regarded as the type of a distinct genus (*Hierofalco*), by Cuvier, the Hobby (*F. subbuteo*), the Kestrel (*F. tinnunculus*), and the Merlin (*F. Æsalon*).

4. Sub-family *Buteonina* (Buzzards).

Bill moderate, hooked from the base, not toothed; third or fourth quill-feather the longest.

Genus *Ictinia* (Vieillot).—Beak short, upper mandible sub-dentated, lower notched; tarsi short and weak; acrotarsia scutellated; wings long; third quill longest.

Example.—*Ictinia plumbea.* Locality, America.

Genus *Circus*.—Beak moderate; nostrils sub-oval; tarsi elongated; acrotarsia scutellated; toes generally short; third quill-feather longest; sides of the head furnished with a circle of feathers very like the disc of owls.

Example.—*Circus æruginosus*, the Marsh Harrier or Moor Buzzard. Locality, Europe, India, Africa. It haunts moors and marshes, feeding on water birds, reptiles, and fish; flies low and buoyantly. Common in many parts of England, Scotland, and Ireland. Undergoes many changes of plumage from youth to maturity.—See Yarrell's 'British Birds.'—Generally builds on the ground. The Hen-Harrier (*Circus cyaneus*) is another example. Locality, Europe, Asia, Africa, North America.

Genus *Pernis*.—Beak moderate; toes covered with serrated feathers; tarsi moderate, semi-plumed; acrotarsia reticulated; third quill longest.

Example.—*Pernis apivorus*, the Honey Buzzard. Locality, Europe and Asia, rare in the British Islands. Feeds on the larvæ of bees, wasps, and coleopterous and other insects, also on mice and reptiles. Frequents woods.

Genus *Buteo*.—Beak moderate; nostrils somewhat rounded; tarsi short; acrotarsia scutellated; fourth quill longest.

Example.—*Buteo vulgaris*, the common Buzzard.

Buzzard (*Buteo vulgaris.*)

The flight of the Buzzard is slow, and it generally remains perched on some tree in the wooded districts, patiently waiting for its prey, viz. small quadrupeds, birds, and reptiles, and even earthworms and insects. It may be seen sometimes soaring in circles, but not often, and does not pursue its game but pounces at it when on the ground. Its nature is slothful and cowardly, but its philoprogenitiveness appears to be great. The cock Buzzard will hatch and bring up the young if the hen is killed (Ray), and, among other instances, Mr. Yarrell records one of a female Buzzard kept in the garden of the Chequers Inn, at Uxbridge, which, showing an inclination a few years back to make a nest and sit, was supplied with materials and two hen's eggs, which she hatched and afterwards reared the chicks. Since that time she hatched and brought up several broods of chickens. Once they put down chicks just hatched to her, to save her the labour of sitting, but she killed them all. Her family, says Mr. Yarrell, in June 1831, consisted of nine; the original number was ten, but one had been lost. When flesh was given her, she was very assiduous in tearing and offering it as food for her nurslings, and appeared uneasy if, after taking small portions from her, they turned away to pick up grain. ('British Birds,' where there is an elegant vignette of the bird and her foster family.) Indeed, the young remain with the old birds some little time after they quit the nest, contrary to the usage of other birds of prey, which generally drive away their young as soon as they can fly. In Scotland, where the bird is said to be bolder, the nest is on rocks or on the edges of steep scars or beds of torrents. (Macgillivray.) In England, the Buzzard builds (or sometimes takes to a nest) in the fork of a tree in a wood. The eggs are generally three, sometimes four, short oval, two inches three lines in length by one inch ten lines in breadth, of a soiled white, slightly spotted with pale brown. (Yarrell.)

Locality.—Common in all the wooded countries of Europe; very abundant in Holland. (Temminck.) It is well known, says Mr. Yarrell, over the wooded parts of the continent of Europe, south of Russia, and inhabits Spain and Italy, passing over the Mediterranean to North Africa; but Trebizond, Smyrna, and Madeira appear to be its limits to the southward. Prince Bonaparte notes it as very common near Rome. In several parts of Ireland it is common (Thompson); not very plentiful in Scotland, nor does it appear in the lists of the birds of Orkney and Shetland by the Rev. Mr. Low and Mr. Dunn, though it occurs in Denmark, Norway, Sweden, and Russia. Mr. Gould, in noticing the Trebizond birds presented to the Zool. Soc. by Mr. Keith Abbott, among which it was, observes that it was not previously observed in Asia, although there is a nearly allied species in the Himalaya Mountains, and that it had not then been noticed in Africa. ('Zool. Proc.,' 1834.) In England, though lately more rare, it is still far from uncommon.

Dr. Richardson ('Fauna Boreali-Americana') states that the common Buzzard arrives in the Fur Countries in the middle of April, very soon afterwards begins to build its nest, and, having reared its young, departs about the end of September. It haunts the low alluvial points of land which stretch out under the high banks of a river, and may be observed for a long time motionless on the bough of a tree, watching for some small quadruped, bird, or reptile to pass within its reach. As soon as it espies its prey, it glides silently into the air, and, sweeping easily but rapidly down, seizes it in its claws. When disturbed, it makes a short circuit, and soon settles on another perch. One of Dr. Richardson's specimens had two middle-sized toads in its crop. It builds its nest, according to the Doctor, on a tree, of short sticks, lining it with deer's hair. The eggs are, he says, from three to five in number, and he remarks that it was seen by the expedition as far north as the 57th parallel, and that it most probably has a still higher range. He gives a description of two; one a male, shot on the 17th June, at the nest which contained three eggs, on the plains of the Saskatchewan; and another, a female, killed at the nest also, near Carlton, May 22.

5. Sub-family *Milvina* (Kites).

Beak moderate, hooked from the base; tail forked. The length of the wings and the forked tail, instruments of action to which these birds are indebted for their peculiar power and gracefulness of flight, are the characters which more particularly separate the kites from the rest of the *Raptores.*

Genus *Elanus.*—Beak moderate, weak, compressed; tarsi short, semiplumed; acrotarsia reticulated; claws, with the exception of the middle one, rounded internally; second quill longest, and with the first notched internally.

Example.—*Elanus melanópterus*, the Black-Winged Swallow-Hawk. Locality, the whole of Africa; India. Lives principally on insects, which it takes on the wing.

Genus *Nauclérus* (Vigors).—Tail very long, and much forked; wings very long; body slender

and elegant; tarsi short; toes feeble; second and third quill longest.

Example.—*Nauclerus furcatus*, the Swallow-Tailed Hawk. Locality, Virginia, Kentucky, and especially the large prairies of the Attacapas and Opellousas. Abundant in the states of Louisiana and Mississippi. They sweep the fields in troops like swallows, and feed on insects, as grasshoppers, &c., small snakes, and other reptiles. (See Audubon, 'Ornithol. Biography.') Two stray specimens have been taken; one in Argyleshire, in 1772, and another in Yorkshire, in 1805. (See Yarrell's 'British Birds,' and 'Linn. Trans.,' vol. xiv.)

Genus *Milvus*.—Bill moderate, weak, subangular above; nostrils oblique, elliptical; tarsi short; acrotarsia scutellated; wings very long, fourth quill longest; tail forked.

Example.—*Milvus ictinus* (*Milvus vulgaris*, Fleming), the Kite. The length of this bird is about 26 inches.

The Kite (*Milvus ictinus*).

The *Kite* sails gracefully in the air, now describing circles and anon with out-spread tail remaining stationary. It pounces on its prey, consisting of moles, mice, leverets, rabbits, unfledged birds, and the young of the gallinaceous tribe especially. It was, when more plentiful than it is at present, a great scourge to the poultry yard. It will eat frogs and snakes, and, in the 'Magazine of Natural History,' an observer bears witness to its taking fish from a broad river near which he resided. The nest, made of sticks and lined with soft materials, is usually built on the fork of a tree in a thick wood. The eggs are two, sometimes three, short oval, two inches two lines in length, by one inch nine lines in breadth. They are of a dirty white, with a few reddish brown spots at the large end. The female lays early in the season, and she often makes a vigorous defence when her nest is attacked.

Locality.—France, Italy, Switzerland, and Germany; less abundant in Russia; more rare in Holland; migratory in autumn. (Temminck.) Very common near Rome, especially near the herds of cattle. (Bonaparte.) It also occurs in Siberia, and the country about Lake Baikal, and has been observed in Egypt, and several parts of Africa north of the equator. In Ireland it does not seem to be known. In Britain, especially in the southern counties, it has become rare, though at one time it was evidently abundant. Clusius states, that when he was in London an amazing number of kites flocked there for the offal which was thrown into the streets. They were so tame, that they took their prey in the midst of crowds, and it was forbidden to kill them. In falconry it was used both as pursuer and pursued, and is very docile. A good instance of this docility is given by Mr. Thompson in the 'Magazine of Zoology and Botany,' vol. ii. p. 172. Louis XVI. flew at the kite with powerful falcons; and Sir John Sebright tells us, that 'Fork-tailed kites were much flown some years ago by the Earl of Orford, in the neighbourhood of Alconbury Hill. A great owl, to the leg of which the falconers usually tie a fox's brush, not only to impede its flight, but to make it, as they fancy, more attractive, is thrown up to draw down the kite.'

Fossil Falconidæ.

Dr. Buckland notices the remains of *Falconidæ* in the first period of the Tertiary series (Eocene period of Lyell), and figures a *Buzzard* (*Buteo*), as recent and fossil, in the first plate of his 'Bridgewater Treatise.'

FALCONRY, or HAWKING, the art of training and flying hawks to take other birds. Julius Firmicus, who lived in the middle of the fourth century, is the first Latin writer who speaks of falconers and the art of teaching one species of bird to fly at and catch another. The art however had been, in all probability, practised in the East from remote ages; whence it certainly came to Europe.

From the Heptarchy to the time of Charles II. falconry was the principal amusement of our ancestors in England: a person of rank scarcely stirred out without a hawk upon his hand, which, in old illuminations and upon ancient seals, is the criterion of nobility. Harold, afterwards king of England, is thus represented in the Bayeux tapestry, when visiting the court of William, duke of Normandy.

Florence of Worcester (4to edit., 1592, p. 310) states that King Alfred had his falconers among the persons whom he encouraged for their skill in different professions; and a metrical treatise on the art of falconry, still extant, is ascribed to King Edward the Confessor.

In 'Domesday Book' the practice of falconry is illustrated by numerous entries. In several places we find a sum, no less than ten pounds, made the optional payment instead of finding a hawk ('Domesd.,' tom. i. folio. 134, b. 172, 230); and once, at Worcester (tom. i. 172) a Norway hawk is specified. Eyries, or places destined for the breeding or training of hawks, are entered in the Survey in Buckinghamshire, Gloucestershire, Worcestershire, Herefordshire, Shropshire, and, more frequently than in other counties, in Cheshire, as well as among the lands between the Ribble and the Mersey.

Nor were hawks less prized at subsequent periods. According to Maddox ('Hist. Excheq.,' i. 273), in the 14th Hen. II., Walter Cnot, one of the king's tenants, rendered his rent at the exchequer in three hawks and three jerfalcons. King John had also his hawks; and upon the Patent Roll of the 34th Hen. III. a copy occurs of the letter which the king sent in that year to the King of Norway for hawks. Bray, in the 'History of Surrey' (vol. iii. p. 82), relates a curious anecdote of Henry III.'s anger with one Roger Belet, who by reason of something he had done or omitted about a Spar-Hawk, was disseised of all his lands and 40*s.* rent in Bagshot. In the 34th Edw. III. it was made felony to steal a hawk; to take its eggs, even in a person's own ground, was punishable with imprisonment for a year and a day, besides a fine at the king's pleasure. In Queen Elizabeth's reign the imprisonment was reduced to three months; but the offender was to find security for his good behaviour for seven years, or lie in prison till he did. (Pennant, 'Brit. Zool.,' 8vo., Lond., 1812, vol. i. p. 212.)

Edward III., according to Froissart ('Chron.,' i. c. 210), had with him in his army, when he invaded France, thirty falconers on horseback, who had charge of his hawks; and every day he either hunted or went to the river for the purpose of hawking, as his fancy inclined him. Queen Elizabeth is represented enjoying this sport in a wood-cut in Turbervile's 'Falconry,' published in 1575; and it was the favourite amusement with King James I.

By an entry upon the Originalia Rolls of the 35th Edw. III. ('Origin.,' vol. ii. p. 267) it appears that a falcon gentil cost 20*s.*, a tersil gentil 10*s.*, a tersil lestour 6*s.* 8*d.*, and a lanner 6*s.* 8*d.*: these were the prices which the sheriff was to give for hawks for the king's use. In an account-book of the 20th Hen. VIII. a goshawk and two falcons are prized at 3*l.*, and 5 falcons and a tersil at 8*l.*

Falconry was attempted to be revived by George, earl of Orford, who died in 1791; and in Yorkshire Col. Thornton had a hawking establishment at a rather later period; Sir John Sebright and a few other gentlemen also practised it in Norfolk at the beginning of the present century. As a rural diversion however, principally in consequence of the inclosures, it has gone into disuse.

The earliest printed treatise on hawking in English is the 'Book of St. Albans,' fol. 1481, ascribed to Juliana Berners, abbess of Sopwell. [Berners.] There are numerous other and curious treatises upon falconry both in French and English, some of them of very rare occurrence.

(Warton's *Observations on Spenser's Fairy Queen;* Strutt's *Sports and Pastimes of the People of England;* and Haslewood's *Literary Researches into the History of the Book of St. Albans*, 4to., Lond., 1810.) [Falconidæ.]

FALKIRK. [Stirlingshire.]

FALKLAND, LUCIUS CARY, VISCOUNT, eldest son of Henry Cary, Viscount Falkland, was born in 1610. He was educated first at Trinity College, Dublin, afterwards at St. John's College, Cambridge. After he had left college he pursued his study of the Greek language with great assiduity and success; and his seat at Burford, about ten miles from Oxford, was often visited by Chillingworth and other learned men of his time. In 1639 he joined the expedition against the Scotch. In 1640 (being only a Scotch peer), he was elected member for Newport, Isle of Wight, in the parliament which assembled on April 13th, and for the same borough in the parliament which met on November 3rd in the same year. Charles I. invited him to become one of his privy council, and offered to make him secretary of state in the room of Sir Henry Vane. Lord Falkland was disinclined to associate himself with the court party, but was, after much persuasion, prevailed upon to accept the king's offers. His severity of moral principle was ill fitted to harmonise with Charles's duplicity and unconstitutional designs, but, the civil war having commenced, he adhered to him with inflexible firmness, using every effort to reconcile the contending powers, and, though without any military command, attending the king on all occasions of conflict or danger. He insisted on making one in the first rank of Lord Byron's cavalry at the battle of Newbury, September 20, 1643, and was shot in the belly with a musket-ball. His chief work was 'A Discourse on the Infallibility of the Church of Rome.' (Clarendon's *History of the Rebellion*, book vii.)

FALKLAND ISLANDS, a group of islands in the South Atlantic, situated between 51° and 53° S. lat., and between 57° and 62° W. long., and consisting of two principal islands, East and West Falkland, with a considerable number of smaller islands. East Falkland is about 90 miles long, and on an average 40 miles wide; West Falkland is about 80 miles long, with a mean width of about 25 miles. The smaller islands, about two hundred in number, vary considerably, from sixteen miles in length and eight in width to mere islets of half a mile in diameter. The area of the whole is about 6000 square miles.

The whole group is deeply indented by sounds, bays, harbours, creeks, and inlets. On West Falkland and some small islands near it, there are high precipitous cliffs in a few places exposed to the western seas; but other places are so low that they cannot be seen from the deck of a vessel five miles distant. There is a perpetual current from the S.W., which brings drift wood from the south extremity of America. We know very little of West Falkland. Fitzroy states that the average height of it is greater than that of East Falkland, though the highest hills seem to be in the last-mentioned island. A chain of high hills, called the Wickham Heights, runs across it in a due east and west direction from Port William to Port Sussex on Falkland Sound. The country north of the Wickham Heights has a hilly surface, and at several places these hills rise to some hundred feet above the general level. That portion of the island which lies south of the Wickham Hills may be considered as a level plain, gently declining towards the southern shores. In some parts of the island the bottoms of the valleys are covered by great angular fragments of quartz rocks. The

most general description of soil is of a very fine dark, almost black, peaty quality, compact, and from a few inches to two feet in depth, lying upon a subsoil of red gravelly clay where the underlying rocks consist of clay-slate. There is in East Falkland excellent bituminous coal. On the hills the subsoil is chiefly a stiff, dirty white clay. The general aspect of the island is very dreary. The only river of any importance is the San Carlos, about 30 miles in length. The climate resembles that of England, but is more equable; the summers are not so hot, and the winters not so cold.

There are no trees in these islands. There are however three different kinds of bushes which are used as fuel. But the numerous peat moors yield a fuel of a dark black colour, which is of excellent quality. The grasses are long and apparently coarse, but they possess very nourishing qualities. One of them, called *tussac*, has especially attracted the attention of naturalists and graziers. The attempts to introduce our vegetables have generally succeeded: turnips, cabbages, lettuces, radishes, and potatoes grow to perfection. It is still doubtful if grain, especially wheat, will grow.

Indigenous animals are not numerous. The only quadruped is the warrah or wolf-fox, a peculiar species confined to this archipelago. Wild cattle and wild horses are numerous; wild pigs are fewer in number. Sheep thrive admirably. Rabbits are very numerous. Of wild fowl there are swans, geese, ducks, snipe, teals, shags, penguins, rock-hoppers, sand-pipers, gulls, Cape-hens, white-birds, albatrosses, owls, a large kind of carrion-hawks and rooks, with some other smaller species. Off the coasts are seals, black whales, and many kinds of fish.

It is not known whether Amerigo Vespucci discovered these islands; but they were seen by Davis in 1592, by Hawkins in 1594, by Strong in 1690, and by several French navigators early in the next century. In 1764 the French, under the auspices of Bougainville established a colony on East Falkland, and called it St. Louis; and two years later the British formed a settlement on West Falkland, under Captain Macbride, on the inlet called Port Egmont. The French colony was afterwards given up to the Spaniards, and the English colony was abandoned; but, when it was found that the islands formed a convenient halting-place for southern whalers, the Republic of Buenos Ayres took possession of them in 1820. England protested against this step in 1829. Meanwhile the government of Buenos Ayres had formed a settlement at Port Louis in 1823, but Great Britain asserted its rights, and the colony was given up to the English in 1833. The islands have since assumed the condition of a regular British colony, and in 1844 a new town was laid out on the southern shore of Stanley Harbour, a land-locked inlet sheltered from every wind.

(Weddell's *Voyage towards the South Pole;* Fitz-Roy and Darwin, in *Narrative of the Surveying Voyages of the Adventure and Beagle;* and Reports of the Colonial Land and Emigration Commissioners.)

FALL OF BODIES. [Accelerated Motion.]

FALLACY. Bentham's definition in his 'Book of Fallacies' is this: 'By the name of fallacy it is common to designate any argument employed, or topic suggested, for the purpose, or with a probability, of producing the effect of deception, of causing some erroneous opinion to be entertained by any person to whose mind such argument may have been presented.' If an argument be undesignedly vicious, it is termed a paralogism, and it is the intention of fraud that constitutes the fallacy or sophism. There is however a legitimate use of fallacy which is often unnoticed by writers on logic. Thus, in modern times, Kant has employed the dilemma for a purely scientific purpose, and. from the impossibility of two opposite and conflicting cases, has inferred, not, as is the usual deduction, that the hypothesis upon which they both rest is false and untenable, but that the truth is intermediate.

For an enumeration and exposition of the several sophisms, see the sections on fallacy in Whately's 'Logic;' and, for the exposure of that class of fallacies which he has called political fallacies, the work of Bentham already cited, 8vo., London, 1824.

FALLING STARS. [Ærolites; Meteoric Stones.]

FALLOPIAN TUBES. The Fallopian tubes, so called from the anatomist who first accurately described them, are tortuous and slender membranous canals about three inches in length, which proceed on each side from the two upper corners of the flattened triangular or pear-shaped body of the uterus. They communicate with its cavity by minute openings capable of admitting a large bristle. As they diverge outwards from their origin, they enlarge, and, curving backwards, terminate obliquely in open fringed extremities directed towards the ovaries, which lie below and somewhat behind them. They are included, as are likewise the ovaries, in the duplicature of the peritoneal lining of the abdomen, called the broad ligaments of the uterus, by which that body is itself invested and attached laterally to the cavity of the pelvis. The function of these tubes is to bring the ovum from the ovaries into the womb.

FALLOPPIO, GABRIELLO, or FALLO'PIUS, was born at Modena about the year 1523. He appears at one time to have held an ecclesiastical appointment in the cathedral at Modena, which he resigned to devote himself to more congenial pursuits. Having gratified his curiosity by travelling through the most interesting parts of Europe, he settled for a time as a public teacher of anatomy at Ferrara, where he had received a medical education. But he soon quitted that university, which was, in fact, a sphere too narrow for his talents, and had lectured at Pisa for some years with increasing reputation under the patronage of the first Grand Duke of Tuscany, when he was induced by the liberal proffers of the Venetian senate to repair to Padua to take the place of Vesalius.

The studies of Fallopius were by no means confined to one department of natural history. He appears to have occupied himself among the rest with the subject of systematic botany, which had

very recently begun to attract attention. In this, as in all other steps in the revival of learning, Italy took the lead. The first botanic garden had been established at Pisa by Cosmo de' Medici in 1543, and was at this time under the management of Cæsalpinus. The second was established two years later at Padua; and the charge of this garden, with the professorial duties annexed to it, was committed to Fallopius soon after his arrival in that university.

In addition to his merit as a naturalist and a teacher, Fallopius was an excellent and expeditious operator, and otherwise, for his time, a good practical surgeon.

After a short but brilliant career of eleven years both in practice and as a teacher, he died at Padua in 1562, and was succeeded by his favourite pupil Fabricius ab Aquapendente.

The only work certainly known to have been revised by himself was a volume entitled 'Anatomical Observations.' It was first printed in 8vo. at Venice, in the year before his death, and has been frequently reprinted. The publication of this work forms an epoch in the science of human anatomy. There is no part of the frame with which the author does not display a masterly acquaintance. Many important parts of it he was the first to describe, if not to observe; and several of them still bear his name. His lectures on pharmacy, surgery, and anatomy were published after his death, in various forms and with very different degrees of fidelity, by his pupils. The best of them were collected and published with his 'Observations' in three volumes folio, Venice, 1584, and have passed through several editions.

FALLOW is a portion of land in which no seed is sown for a whole year, in order that the soil may be left exposed to the influence of the atmosphere, the weeds destroyed by repeated ploughings and harrowings, and the fertility improved at a less expense of manure than it would be if a crop had been raised upon it.

The practice of fallowing land is as old as the Roman Empire. It appears that, wherever the Romans extended their conquests and planted colonies, they introduced this mode of restoring land to a certain degree of fertility when exhausted by bearing grain. The attention of agriculturists has in later times been turned to lessen the necessity of fallows, and to substitute some other means of restoring fertility. It is acknowledged by all experienced farmers that manure alone is not sufficient for this purpose. The ground must be tilled and noxious weeds destroyed; and the only efficacious mode of doing so is to stir the ground at the time when their seeds have vegetated, their roots have made shoots, and before any new seed can ripen. But this is exactly the time when corn is usually growing, and when the land cannot be stirred to expose it to the heat of the sun and to dry the roots which are turned up. The only apparent remedy is therefore not to sow it during one summer, and on this principle lands are usually fallowed.

The effect of light and heat on soils varies with the soils themselves, according as they are wet or sandy. Light sandy soils require only cleansing from weeds; and if this can be done without leaving them fallow for a whole summer a great advantage will be obtained. This has been effected completely by the cultivation of turnips and clover, which was first practised in the light soils of Flanders, and afterwards introduced into the similar soils of Norfolk, from whence it has spread all over Great Britain, and is beginning to be adopted more generally in Ireland. On light lands the preparation for the turnips, the abundant manuring and subsequent hoeing, are as effectual in cleaning the land and bringing it into a fertile state as any complete fallow could ever be; and the clover smothers and destroys the weeds which may have come up amongst the barley or oats sown after the turnips.

On heavy soils it is often impossible to keep the land clear of weeds, in wet climates and unfavourable seasons, without a complete fallow, and when this is the case it is best to do the thing effectually. Upon cold wet soils, which should always first of all be well underdrained, no pains should be spared to get the land perfectly clean. The advice given by the late Mr. Rham to farmers was—Avoid fallows if you can keep your land clean; but, when you fallow, do it effectually, and improve the soil at the same time by chalk, lime, or marl, according to circumstances. Do not spare either ploughs or harrows in dry weather. In short, neither ploughing nor manuring alone will keep a soil in a good fertile state. There must be an occasional fallow for some soils, and turnips or similar husbandry for others. [Arable Land; Rotation of Crops.]

FALMOUTH, a municipal borough, parliamentary borough, and seaport, in Cornwall, is 267 miles W.S.W. from London, by the road. The town is situated on the western shore of the æstuary of the river Fal, and consists principally of one street, which extends along the south-western shore of the harbour for about a mile. There is a convenient quay, at which the water is of sufficient depth to allow vessels of considerable burthen to discharge their cargoes on the wharf. Near the centre of the principal street stand the market-house and town-hall. The Public Rooms, a handsome building, are situate in the heart of the town; and not far from it is the Polytechnic Hall, a spacious and commodious structure, in which are held the annual exhibitions of the Royal Cornwall Polytechnic Society. The parish church was built soon after the Restoration. There are places of worship for various classes of dissenters, and also several schools and charitable institutions. Falmouth is a neat and tolerably well-built town. The municipal borough is governed by 4 aldermen and 12 councillors. Population, 4844. The parliamentary borough is united with Penryn, forming the borough of Penryn and Falmouth, the entire population of which is 12,160.

The harbour is an extensive bay, well protected by the surrounding high lands, and so conveniently situated, that vessels have frequently been able to proceed on their voyage from this port, while those from Plymouth and Portsmouth have been forced back by contrary winds before they

could reach the mouth of the Channel. It is defended by two castles; one, towards the west, called Pendennis Castle, and the other, towards the east, called St. Mawes. Both these castles were built by Henry VIII., and were subsequently improved and strengthened by Queen Elizabeth. There is a light-house on St. Anthony's Point, at the east side of the harbour, and also an obelisk on the Black Rock, which rises out of the sea near the middle of the entrance to the harbour, between Pendennis and St. Mawes. The exports consist principally of the produce of the tin and copper mines. Falmouth is a mail-packet station, and the steamers which run between London and the Mediterranean call there on their outward and homeward passage. The number of sailing vessels registered Jan. 1, 1848, was 111 (6518 tons). The number of sailing vessels, coastwise, from Jan. 1, 1847, to Jan. 1, 1848, was, inwards, 680 (39,261 tons); outwards, 320 (18,838 tons). In the colonial and foreign trade, the number was, inwards, 100 (10,976 tons); outwards, 87 (13,525 tons).

FALSE IMPRISONMENT is an unlawful arresting or imprisoning, either without just cause or without proper legal process. In whatever manner the unlawful detention arises, it is false imprisonment, for which an action in damages lies. Where there is a colour of authority, the usual form of the action for false imprisonment is an action 'on the case;' in other cases the form of the action is that of 'trespass.'

When erroneous process issues out of a court having jurisdiction in the matter, a bailiff or officer who arrests a party in execution of it may excuse himself in an action for false imprisonment by showing that the court had jurisdiction; but, if the court out of which the process issues has no proper cognizance of the cause, then the officer will be liable.

If an arrest be made by one who is not a legal officer, or who has not at the time a warrant, or is not named in it, it is a false imprisonment, for which an action lies. If a sheriff or his bailiff arrest a man out of his county, or upon a warrant of a justice whose commission has expired, or arrests the wrong party, he is liable.

Mere irregularites in lawful process may constitute false imprisonment, and the judges will discharge the party upon condition of his waving his right of action.

All persons concerned in a wrongful imprisonment are liable in an action of false imprisonment, and the party aggrieved may sue any one of them. Thus, if the plaintiff in a suit brings an unlawful warrant to the sheriff, or if he bring a good warrant, but direct the sheriff to the wrong man, the action will lie against both.

FALSE POSITION, a rule of arithmetic, in which the false results of false assumptions are made the means of calculating the true answers. It is now little used, if at all, in its simpler cases, and is entirely merged, as to its more difficult ones, in Newton's method of approximation.

FALSETTO, in Music, an Italian term, signifying a false or artificial voice, produced by tightening the ligaments of the glottis, and thus the vocal compass is extended about an octave higher. The Italians call the falsetto *voce di testa*, or voice from the head, and the natural voice *voce di petto*, or voice from the chest.

FALSTER, a Danish island in the Baltic, lies S. of Seeland, and E. of Laaland, between 54° 30′ and 54° 58′ N. lat., 11° 45′ and 12° 11′ E. long. The strait called the Gaabensesund separates it from Seeland, and the Guldborgsund from Laaland; on the north-east, the Groensund divides it from the island of Moen. Its greatest length from north to south is about 25 miles, and its greatest breadth from east to west is about 16 miles. The area is 180 square miles, and the population 19,400. It is accounted one of the best cultivated and most productive parts of the Danish dominions. The surface is level, and in the south the island terminates in two tongues of land, formed by an arm of the sea called the Noret. The western tongue has a lighthouse upon it, beyond which a reef of rocks extends far into the sea. The produce of grain is more than adequate to the consumption, so that between 30,000 to 35,000 quarters are annually exported. Flax, hemp, hops, potatoes, &c., are grown. Large quantities of fruit are raised, and apples in particular are a considerable article of exportation. The woodlands occupy about one-sixth of the whole surface. Horned cattle, sheep, and swine are bred. Much wax and honey are obtained; and poultry, geese especially, are abundant. There is in the island a large lake called Maribоersee, from which there is an outlet into the sea. There are no important manufactures in the island. The imports are colonial produce, salt, and tobacco; and the exports agricultural produce, salt meat, and live stock. There is some ship-building.

Nykiöbing, the chief town, is situated on the western side of the island upon the Guldborgsund; it is a pleasant well-built place, has some traces of its former fortifications, contains a cathedral, an ancient castle, several schools, a town-hall, a hospital, about 250 houses, and a population of about 1600. It has a good corn trade.

FALUN, a town in Sweden, the capital of the province of Dalecarlia, lies in 60° 35′ N. lat., 15° 35′ E long., and has a population of about 4500. The town is built in a wide valley between two lakes, which are not far from it. It is celebrated for the great mine of copper which is in the middle of the town, and which also yields small quantities of gold, silver, and lead, besides vitriol, ochre, and brimstone. There are a few manufactures of tobacco, linen, cotton, and wool.

FAMAGUSTA. [Cyprus.]

FAMILIES OF PLANTS. The word Family in Botany is mostly applied to a group of plants of the same value as Natural Order. In this sense it has been mostly employed throughout the pages of this work. At the same time, in the arrangements of some writers, a family is made a group of less value than an order; whilst in the writings of others the term is loosely applied to distinguish any group of plants of higher value than a single species. It is thus sometimes employed synonymously with genus. The names of natural orders being mostly those of a genus, which serves as a

type for the rest of the group, are easily Englished by adding the word family. Thus the order *Gentianaceæ* is called in the English the Gentian Family, and so on. By this means the word Family is sometimes restricted to the species of a genus. Another word used synonymously with Natural Order by Dr. Lindley is Tribe. In his Natural System, all the orders having typical genera with English names have been called Tribes, with the English names attached. Thus, *Cinchonaceæ*, the Coffee Tribe; *Pistiaceæ*, the Duck-Weed Tribe; *Euphorbiaceæ*, the Euphorbium Tribe. At the same time Tribe is frequently used to express a group of less value than an Order, as in the larger orders, *Umbelliferæ*, *Leguminosæ*, *Compositæ*, *Cruciferæ*, &c.

FAN, an instrument or machine for agitating the air by the wafting or revolving motion of a broad surface for the purpose of producing artificial currents; such as the fans used by ladies for cooling the face. Large revolving fans, driven by machinery, are frequently used either to facilitate the cooling of fluids or the process of winnowing, or as blowing-machines to urge the combustion of a fire, or to assist in ventilation. Another application of such an apparatus is for the purpose of regulating or checking, by the resistance of the air to its rapid motion, the velocity of light machinery. A familiar example of such a use is afforded by the revolving fans of a musical snuff-box.

FANARIOTES, a name applied to the inhabitants of the Fanar, or Greek quarter of Constantinople. After the capture of Constantinople by the Turks, the Greeks of the Fanar, taking advantage of the ignorance of the Turks, succeeded in rendering themselves necessary to the ministers of the Porte as translators, and to other Turkish grandees as secretaries, agents, and men of business in general. They afterwards acquired a similar position in Wallachia and Moldavia, when, in 1711, a Greek was first nominated Hospodar by the Porte. They were also the chief bankers of the Ottoman empire.

An interesting picture of the Fanariotes is given in Mr. Hope's novel of 'Anastasius; or the Memoirs of a Greek;' as well as in the 'Essai sur les Fanariotes,' by Marco Zallony; and in a work published by Von Hammer, called 'Constantinople and the Bosporus.'

The events which followed the last Greek revolution considerably diminished the importance and altered the position of the Fanariotes.

FANCY, a corruption of phantasy (*φαντασία*), which term in ancient philosophy indicated the sensuous appearance of an object, and in a general sense was used as coextensive with conception, or the faculty by which man reproduces images of objects either absent or present, without an immediate impression on the organs of sensation. At present the use of the word is vague, and it is often used as synonymous with imagination. Those who affect to give it a meaning as distinct from imagination are not very successful in their definitions.

FANDANGO, a quick dance in $\frac{3}{8}$ or $\frac{6}{8}$ time, universally admired and practised in Spain, and supposed to be of Moorish origin.

FANO. [Pesaro e Urbino.]

FANSHAWE, Sir RICHARD, the youngest son of Sir H. Fanshawe, was born in 1608, at Ware Park, in the county of Hertford. He became a fellow-commoner of Jesus College, Cambridge, in 1623, and removed to the Inner Temple in 1626. After travelling for some time on the continent, he was appointed secretary to the embassy at Madrid, and was left resident there till 1638. On the breaking out of the civil war, he declared himself a royalist, was active during the contest, and was taken prisoner at Worcester. He obtained his release, and afterwards served Charles II. at Breda as his Latin secretary. He returned to England with Charles, represented Cambridge in 1661, and was employed in negotiating Charles's marriage with Catherine. He was sent as ambassador to Philip IV. of Spain in 1664, and died at Madrid in 1666, leaving a widow and five children.

Fanshawe found leisure to attend to literature, and produced several works, the most celebrated of which is a translation of Guarini's 'Pastor Fido,' first published in 1648, of which the lighter lyric passages are playful and often melodious, and some of the more sublime choruses are sonorous and majestic. Lady Fanshawe's Memoirs, first published in 1829, is one of the most interesting books of the period to which it relates.

FANTUZZI. [Trento, Antonio da.]

FARIA E SOUSA, a Portuguese writer on various subjects, chiefly in the Spanish language, was born in 1590, in the province of Entre Minho e Douro. His talents were considerable, but he passed his life as a disappointed dependent on the courts of Lisbon and Madrid. During a part of his life he was secretary to the Spanish embassy at Rome; he died a sort of prisoner at large in Madrid, June 3, 1649.

Faria adhered closely to that extravagant school which in Spain was fostered so much by that of the Martinists in Italy. He revelled in bold flights of fancy, but all his beauties are like flowers buried in parasitical weeds. On the other hand, his historical works, which are written in Spanish, are still valuable for their subject-matter.

(Bouterwek, *Spanish and Portuguese Literature;* Nicholas Antonius, *Biblio. Hisp.*)

FARINA. [Starch.]

FARINA'TI, PAOLO, a painter of Verona, was born in 1522. There are several excellent works, in fresco and in oil, by him in the principal cities about Verona, where he and his wife died, in 1606, on the same day. His style of design is robust and vigorous, similar to that of Julio Romano, and his colouring has much of the character of that of the Venetian school. He etched a few designs from sacred and mythological history: they are described by Bartsch.

FARM, is a portion of land which is set apart for cultivation either by the proprietor or by a tenant who pays a certain stipulated rent for it.

The first thing to be considered in taking a farm is the capital which the tenant is possessed of, or of which he can procure the use at a reasonable rate. In the present state of agriculture, a man who takes a farm of 200 acres of arable land, or land partly arable and partly good pasture, will

require from 1600*l.* to 2000*l.*; and it is not the interest either of the landlord or the tenant that he should take the farm unless he can command that sum. The amount of capital required depends in a great degree also on the quality of the land; very rich land requires less capital in proportion to the rent than poor land.

When it is ascertained what extent of farm may be safely undertaken with a given capital, the most important object to be attended to is the condition and fertility of the soil, not only with respect to the natural quality of the land, but the actual state it is left in by the preceding system of cultivation. It will be a great advantage to have had an opportunity of seeing the land at all times, observing it in different seasons and states of the weather, and especially of seeing the crops thrashed out, and ascertaining the quantity of corn which is usually yielded from a certain quantity of straw; for lands very similar in outward appearance will produce a very different return when the crops are thrashed out. Next to the nature of the soil is to be considered the convenient situation of the farm, the disposition of the fields, and the adaptation of the farm-buildings to the most profitable occupation of the land. The roads, especially those which lead to the neighbouring towns, whence manure may be obtained, are a most important object; and, if there is water-carriage, it greatly enhances the value of the farm. The roads to the fields, and the distance from these to the farm-yard; the convenience of having good pasture, or land easily laid down in grass near the homestead, and especially the situation of the farm buildings with respect to the land, and the abundance of good water, are all circumstances which must be well considered, and which will greatly influence the probable profits, and consequently the rent which may be fairly offered

The disposition of the buildings is of great importance both to the landlord and tenant. Large straggling buildings are inconvenient, and cost much in repairs. The house should be neat and comfortable, fit for the residence of a farmer who has a capital such as the farm requires. The farm-yard should be to the north, behind it. Near the house and the farm-yard there should be a small paved court separated from the yard by a low wall. In this court, which should communicate with the dairy, the utensils may be placed on proper benches to air and dry in the sun. The yard or yards in a large farm should be sheltered on the north side by the barns, which need not be so extensive as used formerly to be thought necessary. Every farm which is so extensive as to require more than one floor to thrash the corn on ought always to have a thrashing-mill attached to it. [Barn.] A small yard, distinct from the other, with sheds for the cattle to shelter themselves under in wet and stormy weather, is a great advantage. The cart-sheds should be in the stack-yard, which properly occupies a space north of the barn. There should be a sufficient number of stands with proper pillars and frames to build stacks on. On each side of the yard should be placed the stables, cow-houses, and feeding-stalls, with a pump of good water near the last, and convenient places to put hay, straw, and turnips in, with a machine to cut them. An under-ground cistern near the cow-house and stables, into which the urine and washings of the cow-house may run by means of a sink or drain, is a most useful appendage. Light thatched roofs are sufficient for the sheds and smaller buildings, and even for the cow-houses and stables. The house should always be detached from the farm-buildings, and should have a tiled or slated roof.

The next important question is, what may be a fair rent both to the landlord and the tenant. In the old system a third of the gross average produce was considered as a fair rent, including all the direct payments for the occupation of the land, such as tithes, rates, and taxes; another third was supposed to cover the labour and expenses of the farm and interest of capital: and the remaining third was appropriated to the maintenance of the farmer and his family, out of which he had to save whatever he laid by as a clear profit. But this calculation is no longer applicable to the present state of agriculture. The expenses are greatly increased, and the produce is also greater. Supposing the tenant to have a capital employed equal to ten times the rent, which is often the case, the gross annual produce ought to be equal to five times the rent. This we shall distribute as follows: two-fifths for expenses, including rates, tithes, labour, and interest of capital at five per cent.; one-fifth for rent; one-tenth for improvements and purchase of manure; and three-tenths for the net profit of the farmer, out of which he is to live. It will be found, wherever accurate accounts are kept and a farm is skilfully managed, that the proportions above stated are not far from the truth.

In Scotland it is notorious that rents are much higher than in England, not only for small occupations, but for extensive farms, and that the tenants have complained less of the times than their neighbours in the south. One cause for this difference is, that the Scotch farm-labourer is more advantageously kept as a sort of in-door servant than in England. The horses are also better managed on a Scotch farm. Besides this, the Scotch farmer has generally had the advantage of a scientific education, and of a thorough knowledge of the principles of his profession; and, with the shrewdness peculiar to his country, he knows how to take advantage of every favourable circumstance.

The price of agricultural produce throughout Great Britain, and even Ireland, is brought very nearly to an equality, the only difference being occasioned by the means of transport. But the price of labour still varies much; and this is owing to local circumstances, which it is hoped will gradually cease.

In proportion as the management of a farm requires more skill, and the various operations become more complicated, so the necessity of great accuracy in the accounts becomes more evident. In the accounts of a farm there are many separate items to be taken into consideration. There may be a separate account kept for every field. There should always be one for every crop of

which the rotation consists. There is an account of the labour of men and horses; of the produce of the dairy; of the stock purchased to be fatted, or sold again in an improved state. In short, the divisions of the general account may be increased without limit. M. de Dombasle, at his celebrated farm of Roville, in France, has all his principal servants and his apprentices assembled every evening after the day's work is over. Each man gives an account of the work done by him or under his superintendence, which is written down by the clerk. The orders for the next day are then given, and every one returns to his lodging or his home. In the course of the next day the clerk enters all that is in the journal into a book, where every person employed has an account: every field has one; every servant and domestic animal has one; and every item which can be separated from the rest is entered, both as adding to the account or taking from it.

When a farm has been agreed for as far as rent is concerned, there are always conditions in a lease, which it is of great importance to the farmer to understand fully. It is necessary that the landlord should have some security against the wilful deterioration of his land by a dishonest tenant; but agents are too apt to cramp the tenants by prescribing the exact mode of cultivation, without giving the tenant sufficient scope to try improved methods, which may ultimately be highly beneficial to all parties. If the landlord can ensure that the proper quantity of manure is put on the land every year, and that it shall be well tilled and kept free from weeds, he need not have any other protection, unless it be for the last two or three years of the lease, when the tenant might be induced to over-crop the land, and thus exhaust it.

FARMER, DR. RICHARD, was born at Leicester, August 28, 1735. He was educated in the Free Grammar School of his native town, and in 1753 was entered a pensioner of Emmanuel College, Cambridge. In 1760 he became Classical Tutor of Emmanuel College, which office he held until his election to the mastership in 1775. He served the office of Vice-Chancellor in the same year, and in 1778 was elected Chief Librarian to the University. In 1780 he was collated to a prebendal stall at Lichfield, and some time afterwards became Prebendary of Canterbury, which he resigned (1788) for the office of a Canon Residentiary at St. Paul's. He died at Emmanuel Lodge, Sept. 8, 1797.

Dr. Farmer is known by his 'Essay on the Learning of Shakspeare,' which had a reputation founded upon the author's confident assumption that Shakspeare had been an ignorant man unduly elevated by misjudging admirers, and that Farmer, a learned man, had stripped the mask from the pretender.

FARMERS-GENERAL. *Fermiers Généraux* was the name given in France under the old monarchy to a company which farmed certain branches of the public revenue, that is to say, contracted with the government to pay into the treasury a fixed yearly sum, taking upon itself the collection of certain taxes as an equivalent. The system of farming the taxes was an old custom of the French monarchy. The sale of salt was also a government monopoly. Sully, the able minister of Henry IV., seeing the loss to the public revenue occasioned by this system, by which, out of 150 millions paid by the people, only 30 millions reached the treasury, opened the contracts for farming the taxes to public auction. By this means he greatly increased the revenue. But the practice of private contracts through favour or bribing was renewed under the following reigns. In 1728, under the regency, the various individual leases were united into a Ferme Générale, which was let to a company, the members of which were henceforth called Fermiers Généraux. In the time of Necker, the company consisted of forty-four members, who paid a rent of 186 millions of livres, and Necker calculated their profit at about two millions yearly—no very extraordinary sum, if correct. But independent of this profit there were the expenses of collection, and a host of subalterns to support: the company had its officers and accountants, receivers, collectors, &c., who, having the public force at their disposal, committed acts of injustice towards the people, especially the poorer class. The 'gabelle' or sale of salt was a fruitful source of oppression. Not satisfied with obliging the people to pay for the salt at the price fixed upon it in the name of the king, they obliged every individual above eight years of age to buy a certain quantity of salt whether wanted or not. But the rule was not alike all over France; in some provinces, which enjoyed certain privileges, salt was 9 livres the hundredweight, whilst in others it cost 16, and in some 62 livres. Besides, every article of provision that was exported from one province to another was subject to duties. These instances convey an idea of taxation in France previous to the Revolution. A lively picture of the whole system is given in Breton's 'Histoire Financière de la France,' 2 vols. 8vo., Paris, 1829. The farmers-general, as the agents of that system, coming into immediate contact with the people, drew upon themselves the popular hatred. The Revolution of 1789 swept away the farmers-general, and put an end to the system of farming the revenues: it equalised the duties and taxes all over France; but the monopoly of the salt and tobacco remained, as well as the duties on provisions, cattle, and wine, brought into Paris and other large towns, called the *octroi*.

In England the only tax that is farmed is that on post-horses. The excise duties were farmed for some years prior to 1683.

The Roman system of levying taxes, at least after the Republic had begun to acquire territory out of Italy, was by farming them out. In the later period of the Republic the farmers were from the body of the Equestrian order. Individuals used to form companies or associations for farming the taxes of a particular district: the taxes were let by the Censors for a period of five years. These farmers were called Publicani, and by the Greek writers Telónae (τελῶναι), which is rendered by Publicans in the English version of the New Testament. These tax-collectors in the pro-

vince were only the agents. The principals generally resided at Rome, where the affairs of each association (Societas) were managed by a director called a Magister. The individual members held shares in the undertaking. There was also a chief manager in the province or district of which the company farmed the tax, who was called Promagister.

There are no means of knowing what proportions of the taxes collected reached the Roman treasury (ærarium). Numerous complaints of the rapacity of the Publicani or their agents occur in the classical writers. These Publicani were the monied men of the late Republic and the early Empire, and their aid was often required by the state for advances of money when the treasury was empty.

FARNABY, or FARNABIE, THOMAS, a learned critic and grammarian, was born in London in 1575. His great-grandfather, an Italian musician, was the first of his family who settled in England. Thomas was admitted of Merton College, Oxford, in 1590, but he quitted the university abruptly, changed his religion, passed over to Spain, and was received into one of the colleges of that country belonging to the Jesuits. Growing weary of the discipline of the Jesuits, in 1595 he joined Sir Francis Drake and Sir John Hawkins in their last expedition. He is reported also to have served subsequently as a soldier in the Low Countries. On returning to England, he landed in Cornwall, and in the urgency of his necessities descended to the humble employment of teaching children their horn-book. After some time he changed his residence to Martock, in Somersetshire, where he established a grammar-school for youth with great success. From Martock he removed to London, and opened a school in Goldsmiths' Rents, behind Redcross Street, near Cripplegate, where he had a great number of scholars. Anthony à Wood says his school was so frequented, that more churchmen and statesmen issued from it than from any other school taught by one man in England. In 1636 he quitted London to reside at Sevenoaks in Kent; but here he resumed his former occupation, and, with the wealth which he had accumulated, purchased landed property both in Kent and Sussex. In 1641 he became mixed up with the commotions of the times as a favourer of the royal cause, and was fortunate in receiving no other punishment than imprisonment. He died on the 12th of June, 1647, and was interred in the chancel of the church at Sevenoaks.

He was the editor of several Latin writers, Juvenal, Persius, Seneca, and others. He also published a selection of Greek epigrams, 8vo., London, 1629, 1650, and various other school books.

FARNHAM. [Surrey.]

FARO. [Algarve.]

FAROE, FEROE, or FAROERNE ISLANDS, a group twenty-two in number, seventeen of which are inhabited; they are about 300 miles west of the coast of Norway, and about 200 north-west of the Shetland Isles, between 61° and 63° N. lat., and 8° and 6° W. long. They were discovered between the years 858 and 868 by some Norwegians, and at present belong to Denmark. Their whole area is estimated at about 494 square miles, and the population is about 6000.

These islands mostly consist of steep rocks, some of them rising gradually from the sea, by two or more sloping terraces, covered with a thin stratum of earth, which produces grass. Close to the sea the land consists in general of perpendicular rocks, from twelve to eighteen hundred feet in height. The interior is composed of hills, usually separated only by narrow ravines, in which there are brooks or rivulets, which are in general so swollen in the rainy season as to become impassable: there are no valleys of any extent. There are several lakes, water-falls, and natural springs. The climate is very bleak, and the summer lasts only through the months of July and August. The soil is stony, and in many parts covered with earth only four inches deep. In some islands there are majestic masses of basalt formation, similar to the caves of Staffa. Neither the soil nor climate admit of any extended tillage. The chief kinds of cultivated plants are barley, rye, potatoes, turnips, parsnips, and carrots. Sheep, horses and dogs are numerous, and of good growth. Whales, seals, and numerous kinds of fish and wild fowl are found among and around the islands. Turf, coal, copper, jasper, and opal are met with.

The inhabitants are of Norman (or Norwegian) descent, and speak the Norwegian language with a Danish accent. They have in general handsome features, and are well made. They are honest, hospitable, and simple in their manners. In most respects they resemble the Norwegians. They carry on many branches of manufacture. The five chief islands are Stromoe, 27 miles long by 7½ broad; Osteroe, 20 miles by 10; Sandoe, 13 miles by 1½; Suderoe, 17 miles by 5½; and Vaagoe, 13 miles by 5. The chief town of the group is Thorshavn, on Stromoe. The remainder of the inhabited islands are Myggenaes, Fugloe, Svinoe, Videroe, Bordoe, Konoe, Kalsoe, Kolter, Hestoe, Nolsoe, Skuoe, and the greater Dimon.

(Landt's *Faroerne;* Thaarup's *Danske Stat;* Hassel's *Denmark.*)

FARQUHAR, GEORGE, was born at Londonderry in 1678, and educated at the University of Dublin. At an early age he made his appearance on the Dublin theatre, but, not being successful, he abandoned it, and accompanied Wilks, the actor, to London, being then only 17 years of age, and the Earl of Orrery gave him a commission in his own regiment.

Wilks exhorted him to try his powers as a dramatist. Accordingly in 1698 he produced his comedy of 'Love and a Bottle,' which was so successful as to encourage him to another effort. His 'Constant Couple,' which appeared two years afterwards, was played 53 nights in the first season, and a sequel, under the title of 'Sir Harry Wildair,' was also favourably received, though much inferior in merit. In 1703 he produced a version of Beaumont and Fletcher's 'Wild-Goose Chase,' under the name of the 'Inconstant.' He was married in the same year, and getting into great difficulties was forced to sell his commission,

He soon after fell into a decline, and died in 1707. During his last illness he wrote his celebrated comedy of the 'Beaux Stratagem.'

The appearance of Farquhar's comedies may be regarded as an important epoch in the history of the English drama. Farquhar attended more to character than most writers of the day: he introduced a variety of classes talking in appropriate language, while the persons of Congreve's drama were but an assembly of professed wits, and those of Etherege and others were only rakes, city dupes, unfaithful wives, and women of the town, most of them speaking pretty much alike.

FARRANT, RICHARD, one of the fathers of English Church music, was a gentleman of the chapel-royal in 1564, and subsequently organist and master of the choristers of St. George's Chapel, Windsor. His service in G minor, and his two anthems, 'Hide not thou thy Face,' and 'Call to Remembrance,' are highly admired.

FARRINGDON. [Berkshire.]

FARRIERY. [Horse.]

FARSISTAN. [Persia.]

FARTHINGALE, or VARDINGALE, a hoop, a circle of whalebone formerly worn by ladies to spread the petticoat to a wide circumference. The farthingale afforded the ladies a great opportunity of displaying their jewels, and the other ornamental parts of their dress, to the utmost advantage, and for that reason obtained the superiority over the closer habits and the more simple imitations of nature. The hoop, the last remains of the farthingale in England, went out at the beginning of the reign of George IV.

FASCICLE, in Botany, is, strictly speaking, that kind of inflorescence in which the flowers are arranged in a flat-headed raceme or corymb, and begin to expand in the centre sooner than at the circumference. The term is however constantly applied to any collection of flowers or leaves in clusters at the end or on the sides of a branch; thus the leaves of the larch are called fasciculate.

FASCINES are bundles of strong brush-wood, employed chiefly for the purposes of reveting the epaulements of batteries and covering the roofs of field-magazines or other blindages, but occasionally to increase the heights of trench parapets, and to make temporary roads over marshy ground. Fascines are commonly about 8 or 9 inches in diameter, and, when made, are 18 feet long; but they are then, if necessary, cut by the saw into parts of any required lengths, which are generally 6 feet or 12 feet. A fascine of the longest kind is sometimes called a saucisson.

FAST, abstinence from food, more particularly used for such abstinence as a religious observance; from the Anglo-Saxon *fæstan*.

Religious fasting has been practised in almost all ages and all countries. The fixed days appointed by the Church of England for fasting are, the forty days in Lent; the ember days at the four seasons, being the Wednesday, Friday, and Saturday after the first Sunday in Lent, the Feast of Pentecost, September 14th and December 13th; the three rogation days, being the Monday, Tuesday, and Wednesday before Holy Thursday; all the Fridays in the year except Christmas Day. The 30th of January is observed as a fast, in repentance for the execution of Charles I.: and other days of fasting are occasionally appointed by royal proclamation.

FASTI were marble tables at Rome, on which were inscribed the names of the consuls, dictators, censors, and other principal magistrates of the republic. Fragments of these tables have been collected, and are ranged along the walls of one of the halls in the palace of the Conservatori on the Capitol. The deficiencies in the series of the consuls have been supplied by means of the historians, and by consulting monumental inscriptions. Several learned men in modern times have compiled Fasti, or chronological tables of the Roman consuls. Among the most learned of these compilers is Sigonio of Modena, who published his 'Fasti Consulares ac triumphi acti a Romulo rege ad Titum Cæsarem,' fol., 1559; and Pighius, who published 'Annales Magistratuum et Provinciarum S. P. Q. R. ab Urbe condita,' fol., 1599. Other editions of the Fasti have been made from various sources. The word Fasti is often used as synonymous with the annals or chronicles of a nation.

The Romans had another kind of Fasti, which they called 'Fasti Minores,' a kind of almanacks, in which were registered the periodical festivals, games, official days for business, &c. Ovid wrote a poem explanatory of these Fasti, which he dedicated to Germanicus, and in which he described the origin of the festivals, and the recollections, either happy or calamitous, connected with the various days of each month. The poem, as we have it, is in six books, one for each of the first six months of the year; the rest is lost.

FASTING. [Abstinence.]

FAT is of two different kinds, which differ as to their melting point: these are termed *olein* (or *elain*) and *stearin*. The substances to which these names are given are not however in all cases absolutely identical; they vary as to smell, taste, solubility in alcohol, &c.; but all fats agree in being insoluble in water, and in not containing any nitrogen, which is a common constituent of most other animal matter.

Human Fat varies a little according to the part of the body producing it; that from the region of the kidneys, after it has been melted, is yellowish and inodorous; it begins to concrete at 76° Fahr., and is solid at 64°. The *Olein* of human fat is a colourless, oily, sweetish fluid, and remains so at 40°; at 60° its specific gravity is 0.913. *Ox Fat*, when melted, begins to solidify at 98°, and the temperature then rises to 102°. It contains about three-fourths of its weight of stearin, which is solid, hard, colourless, not greasy, and of a granular crystalline texture. The olein of ox fat is colourless, nearly inodorous, and its specific gravity is 0.913. *Sheep's Fat* (or *Mutton Suet*), by exposure to the air, acquires a peculiar odour. After fusion it congeals at a temperature varying between 98° and 102°. The stearin is white, translucent, and after fusion but imperfectly crystalline. *Hog's Fat*, or *Hog's Lard*, is a soft colourless solid, which fuses between 78° and 86°; the stearin of hog's lard is inodorous, solid, and granular. *Goat's Fat* contains a peculiar fat,

termed by Chevreul *Hircin*, to the presence of which its peculiar odour is owing. *Goose Fat* is colourless, and of a peculiar taste and smell.

The fluid fats, whether of animal or vegetable origin, are usually termed *oils*. [Oils.]

The olein and stearin of animal fats are highly useful and important substances in the manufacture of soap and candles; for the latter purpose stearin has been of late very advantageously employed, and to a considerable extent as a substitute for wax.

A controversy has been going on on the continent respecting the formation of fat. Dumas and many French chemists maintain that all the fat of animals originates in and is obtained from plants; while Liebig thinks that a portion of it is formed by the animal itself from starch, sugar, and gum. The question is not yet decided.

The following analyses of the stearin and olein of mutton suet may be taken as examples of the general composition of these substances:—

	Stearin.	Olein.
Hydrogen . .	11.770	11.090
Carbon . . .	78.776	79.354
Oxygen . . .	9.454	9.556
	100.000	100.000

FA'TA MORGA'NA, a name of uncertain derivation given to a very striking optical delusion which has been principally remarked in the Strait of Messina, between the coasts of Sicily and Calabria. It consists usually of the images of men, houses, &c., which are occasionally seen from the coast, sometimes in the water, and sometimes in the air, or at the surface of the water. The same object has frequently two images, one in the natural and the other in an inverted position: the images of a single object are said also to be sometimes considerably multiplied. The phenomenon is accounted for by the refractions of light in the air above the surface of the sea, that air being at times more rare, and at other times more dense, than the air over the land. [Mirage.]

FATHER. [Parent and Child.]

FATHERS OF THE CHURCH is the name given to the early teachers and expounders of Christianity, who lived between the second and the sixth centuries of our æra, and whose writings are looked upon as possessing considerable authority in matters of faith.

The study of the Fathers is interesting, not only to theologians, but to those who would examine carefully the state of philosophy and of society in their time. They are now much studied in the universities of Germany. Notices of the most eminent of the Fathers are given under their respective names.

FATHOM. [Weights and Measures.]

FATIMIDES, the name of a race of kings, who assumed the title of caliphs, and reigned for many years over the north of Africa and Egypt. They obtained the name from the pretensions of the founder of the dynasty, Abu Mohammed Obeidallah, who asserted that he was descended from Fatima, the daughter of Mohammed and wife of Ali. The princes of this family were also called the Aliades, in consequence of their descent, real or pretended, from Ali.

Obeidallah, the first Fatimide caliph, was born A.D. 882. He founded Mahadi on the site of the ancient Aphrodisium, a town on the coast of Africa, about 100 miles south of Tunis, and made it his capital. He became the author of a great schism among the Mohammedans by disowning the authority of the Abbasides [Abbasides], and assuming the title of Emîr al Mûmenîn, 'prince of the faithful,' which belonged exclusively to the caliphs.

Caiem succeeded his father A.D. 933. His reign was unfortunate; but his son, Mansour, who succeeded him in 946, by his valour and prudence regained all that had been lost, and laid the foundations of that power which enabled his son Moez to conquer Egypt.

Moez (A.D. 955) was the most powerful of the Fatimide caliphs. He was successful in a naval war with Spain, and took the island of Sicily; but his most celebrated conquest was that of Egypt, which was subdued by his lieutenant A.D. 972. Two years afterwards he removed his court to Egypt, and founded Cairo. The Arabic historians greatly extol the virtues of this caliph.

Aziz (A.D. 978) consolidated the power acquired by his father by a wise and mild government. He married a Christian woman, whose brothers he made patriarchs of Alexandria and Jerusalem.

Hakem was only 11 when he succeeded his father A.D. 996. He is distinguished even among oriental despots by his cruelty and folly. His persecution of the Christians led them to appeal to their brethren in the West, and was one of the causes that led to the crusades. He was assassinated in consequence of the intrigues of his sister, and was succeeded by his son

Dhaher (A.D. 1021). Egypt was afflicted in the reign of Dhaher with one of the most dreadful famines that ever visited the country.

From Mostanser (1037) to Adhed (1160) the 14th caliph of the dynasty, the power of the Fatimides rapidly declined. Mostali, the 9th caliph, reduced Jerusalem, which had been independent for about 20 years, under princes of the Ortok family, but it was taken by the crusaders in 1099, and in 1100 Mostali, with an immense army, sustained a ruinous defeat from them near Ascalon. Under Adhed the quarrels of the rival vizirs (for the caliphate had become a mere title) led to application for assistance to Noureddin, and his nephew Saladin [Salah-ed-Deen] who subdued Egypt, and took possession of it for themselves as vizirs, under Mosthadi the Abbaside caliph, whom they nominally restored in 1171. Adhed, who was then on a sick-bed, died a few days after, ignorant, as it is said, of his loss.

(Mill's *History of Muhammedanism;* Mill's *History of the Crusaders;* Gibbon's *Decline and Fall.*)

FAUN, FAUNUS, was the name given in the Roman mythology to the gods or genii of the woods, corresponding with the Pans of the Greek mythology. The Fauni were supposed to be the descendants of Faunus, an old mythical king of Latium.

FAUNA, a term employed by naturalists to express the whole of the members of the animal kingdom living in a particular district or at a particular time. Thus all the animals living in Great Britain constitute the British Fauna; those inhabiting the land form the terrestrial Fauna; those found in the seas constitute the marine Fauna. It is often applied collectively to all the animals of the world, the extinct species constituting the fossil Fauna, and the living species the recent Fauna of the world. The word is derived from the Fauni [FAUN], who were supposed to be the patrons of wild animals.

The word Flora is also applied, in the same way, to comprehend the whole of the plants of a district, and admits of the same applications as the term Fauna. It is derived from Flora, the goddess of Flowers. [FLORA.]

FAUSSE-BRAIE, a name given to the rampart which is sometimes formed on the exterior of and parallel to that which constitutes the principal enceinte of a fortress. The Italian engineers of the 16th century applied the term *fossa-brea* to a detached wall of masonry in the ditch of a fortress; but the modern *fausse-braie* is usually a rampart, with a parapet, of earth.

In and immediately before the time of Vauban, the fausse-braie was contiguous to the general rampart, and several feet lower: it was intended for the defence of the ditch and covered-way by a closer and more grazing fire than that of the principal rampart; but the enfilading fire to which the parts in front of the bastion were liable, and the destructive effects of the shells and grenades thrown into the work by the enemy, rendered it impossible for the defenders to remain in it at the time when their services were most required; it also afforded to the enemy some facilities in escalading the rampart. On account of these defects, this kind of fausse-braie has been long since suppressed, and the use of it in defending the ditch is supplied by the tenaille. [TENAILLE.]

FAUSTI'NA, ANNIA, was the daughter of Annius Verus, præfect of Rome; she married Antonínus before his adoption by Hadrian, and died in the third year of her husband's reign, 36 years of age. She left only one surviving child, named Faustina. [ANTONINUS PIUS.]

Coin of Faustina the Elder.
British Museum. Actual Size. Copper.

FAUSTI'NA the Younger, daughter of the preceding, married her cousin Marcus Aurelius, and died, A.D. 176, in a village of Cappadocia at the foot of Mount Taurus, on her husband's return from Syria.

Coin of Faustina the Younger.
British Museum. Actual Size. Copper.

FAVERSHAM. [KENT.]

FAVOSI'TES, a genus of fossil Zoophyta, common in the Silurian strata of Norway and Wales. (Murchison, *Silurian System.*)

FAVULA'RIA, a generic title of certain fossil plants allied to *Sigillaria*, as *F. tessellata*, from the coal formation. (Sternberg.)

FAWKES, GUY, or GUIDO. As the connection of this individual with the 'Gunpowder Plot' is his only claim to distinction, we must very briefly detail the circumstances of that plot, and enumerate his associates. Much discontent had been felt by the great body of Roman Catholics in England, occasioned by the harsh measures adopted against them by James I., but only very few engaged in or were trusted with a knowledge of this intended atrocity.

The design of blowing up the House of Lords with gunpowder at the opening of parliament, and thus destroying at a single blow the King, the Lords, and the Commons, was formed about the summer of 1604, and it was united with a scheme for carrying off a member of the royal family. Prince Charles was considered the most likely, who was to be proclaimed king. The conceiver of this desperate and bloody vengeance was Robert Catesby, a Catholic, the son of Sir William Catesby, who had been several times imprisoned for recusancy. Catesby disclosed his scheme to John Wright and Thomas Winter, the former descended from a respectable family in Yorkshire, the Wrights of Plowland in Holderness; the latter from the Winters of Huddington in Worcestershire, where they had been in possession of estates since the time of Henry VI. Winter introduced Fawkes, whom he had brought from the Netherlands. Fawkes was a gentleman of good parentage and respectable family in Yorkshire; his father, Edward Fawkes, was a notary at York, and held the office of registrar and advocate of the Consistory Court of the Cathedral. Of his education and early history nothing is known; but he had served in the Spanish army in Flanders. Soon after Winter's return to London, Thomas Percy, the relation and confidential steward of the Earl of Northumberland, joined the four conspirators already mentioned. Percy took the next step. He hired the house adjoining the Parliament House, and after some preliminary steps they commenced on Dec. 11, 1604, to form a

mine. Parliament had been prorogued to Feb. 1605, but was again prorogued from February to October. They proceeded with their operations, but before they had got through the thick wall they were enabled to hire a vault immediately under the House of Lords, which had been occupied by one Bright for the sale of coals. About twenty barrels of powder were conveyed thither; iron bars and other tools that had been used in mining were also thrown among the powder that the breach might be the greater, and the whole was covered over with faggots. Lumber of various kinds was placed in the cellar to prevent any suspicion of the curious or the watchful. In May 1605, the preparations were complete: the conspirators, having marked the door, in order that it might be seen if any one entered the vault, consented to separate; before their separation however it was proposed that an attempt should be made to obtain foreign co-operation by informing Sir William Stanley and Owen of the project. This was agreed to on condition of their being sworn to secrecy, and Fawkes was despatched to Flanders for the purpose of conferring with them. Soon after Fawkes's return from Flanders the parliament was further prorogued from October to the 5th of November. These repeated prorogations alarmed the conspirators, and led them to fear that their project was suspected. Their alarms however having been discovered to be groundless, Catesby purchased horses, arms, and powder, and under the pretence of making levies for the archduke in Flanders, assembled friends who might be armed in the country when the first blow was struck. As considerable sums of money were necessary for these purposes, it was proposed to admit into the confederacy three wealthy men, Sir Everard Digby [DIGBY], Ambrose Rookwood of Coldham Hall in Suffolk, and Francis Tresham, the son of Sir Thomas Tresham of Rushton in Northamptonshire. These gentlemen were afterwards sworn in.

As the day of meeting of parliament approached, it was finally determined that Fawkes should fire the mine with a slow match, which would allow him a quarter of an hour to escape. One subject of discussion only arose, whether and how the Roman Catholic peers should be warned of their danger: but the danger of communicating the project to so large a number of persons was considered so imminent, that they despaired of saving all of them, and it was concluded that no express notice should be given them, but only such persuasion, upon general grounds, as might deter them from attending. Many of the conspirators were averse to this advice and angry at its adoption; and Tresham in particular, for his sisters had married Lords Stourton and Mounteagle; and from this time he ceased to attend the councils of the conspirators.

On Saturday, the 26th of October, ten days before the meeting of parliament, Lord Mounteagle received a letter from one of his pages, who stated that he had received it in the street from a stranger, who pressed its instant delivery into his master's hands. The letter was vague, but alarming, and it is probable was written by Tresham. Mounteagle showed the letter to some of the lords of the council and to the king, and the intelligence as to the letter was soon known to the conspirators, who however made no attempt to escape, and Fawkes alone, with the extraordinary courage which he had displayed throughout the transaction, took up his station in the cellar. On Monday, the 4th of November, search was commenced, and about twelve o'clock on the night Fawkes was seized as he came out of the cellar: matches and touchwood were found upon his person, a dark lantern with a lighted candle stood behind the cellar door, and under the faggots 36 casks of gunpowder. Fawkes at once avowed his purpose to the magistrate, nor were his courage and composure disturbed when he was examined before the king and council.

A feeble attempt was made by the other conspirators to assemble in arms in Warwickshire and Worcestershire. At Holbeach an obstinate defence was made, in which the two Wrights, Percy, and Catesby were killed, and Rookwood and Thomas Winter wounded. The others were eventually taken. Tresham died a natural death in prison, and on the 27th January, 1606, eight persons, namely, Robert Winter, Thomas Winter, Guy Fawkes, John Grant, Ambrose Rookwood, Robert Keyes, and Thomas Bates, were tried at Westminster by a special commission, for being concerned in the gunpowder-plot. Sir Everard Digby was arraigned and tried separately for the same crime. There is reason to believe that Fawkes was tortured in order to make him confess more fully. All the prisoners were found guilty, and upon all the sentence of death was passed. Care was taken to render their execution, which took place on the following Thursday and Friday, as solemn and impressive as possible.

FAWN. [DEER.]

FAYAL is one of the Azores. It is situated in 38° 30′ N. lat., and near 29° W. long., and is more than 24 miles long from E. to W. The surface, uneven, rocky, and in some parts mountainous [AZORES], has nevertheless a very fertile soil, and vegetation is favoured by the mildness of the climate. The island grows firs and palms, pine-apples, oranges, &c., but the principal object of agriculture is the vine. In good seasons from 8000 to 10,000 pipes of wine are exported, chiefly to America. Oranges are sent to England and corn to Brazil; but since 1840 the orange trade has been much injured by the appearance of an insect of the coccus kind, which infests the trees, and deteriorates the fruit so as to render it unfit for packing. Fayal is visited by many vessels for provisions or refitting. American whalers occasionally deposit large quantities of oil, the produce of the outward voyage, at Fayal, to be thence trans-shipped to American ports. The capital, *Horta*, sometimes improperly called Fayal, is a pretty town with close upon 10,000 inhabitants; it has the best harbour in the whole group, and is the chief place of export for the produce of the Azores.

FAYETTE, COMTESSE DE LA. *Marie Magdelaine de la Vergne*, the daughter of a nobleman of Provence, was born in 1632. In 1655

she married Francis, Comte de la Fayette. Madame de la Fayette wrote several novels which obtained a high reputation at the time, being the first of the kind in France written in a natural style and free from the exaggerations and affectation of former novelists. She also wrote several other works on contemporary history. Her printed works were collected and published together in 8 vols. 12mo., Paris, 1786, with a notice of her life. Her correspondence was published in 1805. Madame de la Fayette died in 1693.

FAYETTE, GILBERT MOTTIER, MARQUIS DE LA, was born on the 1st of September, 1757, at Chevagnac, near Brioude, in the present department of the Haute Loire. He married at the age of sixteen Mademoiselle de Noailles d'Ayen. When the American revolution broke out, La Fayette made an offer of his services to Benjamin Franklin, which being accepted, he armed a vessel at his own expense, and landed at Charlestown in April 1777. He fought as a volunteer at the battle of Brandywine, on the 11th of September, 1777, in which he was wounded. Congress having given him a brevet of major-general, he served in the north under Washington's orders, and was at the battle of Monmouth in June 1778, and afterwards received the thanks of Congress for his gallant conduct, and the present of a valuable sword. In 1779 he returned to France, the government of that country having acknowledged the independence of the American States, and he obtained assistance in men and money, with which he returned to America. In 1780 he commanded the advanced guard of Washington's army; and in the following year he was intrusted with the defence of Virginia against Lord Cornwallis. Being joined by Washington and Rochambeau, he contributed to the operations in consequence of which Lord Cornwallis was obliged to capitulate at York Town. After the surrender of Cornwallis he returned to France for fresh reinforcements, but the peace of 1783 prevented his sailing back to America.

In 1789, being returned a member of the Assembly of Notables, he advocated the abolition of the lettres-de-cachet and of state-prisons, and he supported the claims of the Protestants of France, who were still labouring under civil disabilities. The States-General met at Versailles on the 5th of May, 1789, and La Fayette was one of the deputies of the nobility. In July he proposed the Declaration of Rights. In the same month, being appointed commandant-general of Paris, after the insurrection of the 14th of July, he organized the national guard, and distributed among the soldiers a tricoloured cockade, namely, blue and red, the colours of the commune of Paris, and white, the colour of the lilies of France, and these became henceforth the national colours. On the 5th of October of that year he marched at the head of the national guard to Versailles, where a tumultuous multitude had preceded him; and he escorted the royal family to Paris, whither the Assembly also removed their sittings. He voted in the Assembly for all or nearly all the measures which destroyed the old system. La Fayette's

opinions were republican, but there is no evidence that he ever contemplated the overthrow of royalty; and the excesses of the revolution made him a strong supporter of the constitutional monarchy. After the king's forced return from the flight of Varennes, La Fayette supported the decree by which the king was restored to the exercise of his regal office on swearing to the new constitution. The disturbances which occurred on this occasion in the Champ de Mars were put down by La Fayette and the national guard, with the loss of a few lives. Soon afterwards La Fayette gave in his resignation, and was an unsuccessful candidate for the mayoralty of Paris against Pétion. When the war of the first coalition began, he was appointed to the command of the army of Flanders, and he defeated the allies at Philippeville and Maubeuge. He was however hated by the Jacobins at Paris, and always had been mistrusted by the court. On the 16th of June, 1792, he wrote a strong letter to the Legislative Assembly, denouncing the plots of those men 'who, under the mask of democratic zeal, smothered liberty under the excess of their licence.' On the 28th he went to Paris, and demanded of the Legislative Assembly the punishment of the outrages committed against the king at the Tuileries on the 20th of June. Finding that he could do nothing at Paris, he returned to his army on the 30th, and on the evening of the same day the Jacobins of Paris burnt him in effigy in the Palais Royal. La Fayette expressed to his officers his disapprobation of the attack on the Tuileries on the 10th of August, and on the 15th of that month he arrested the commissioners sent by the Legislative Assembly to watch him. Upon this he was outlawed, and was obliged to cross the frontier with a few friends. His intention was to repair to some neutral country, but he was arrested by the Austrians and carried to the fortress of Olmütz, in Moravia, where his wife and daughter joined him. He remained in prison for five years, and was released at last by the treaty of Formio; but, not approving of the arbitrary conduct of the Directory, he repaired to Hamburg, and did not return to France until after the 19th Brumaire, 1799. Here he found himself again in opposition to Bonaparte's ambition, and he voted against the consulship for life, refused all employment under him, and retired to the country, where he applied himself to agricultural pursuits.

In 1815 he was returned to the house of representatives convoked by Napoleon on his return from Elba. After the defeat at Waterloo he spoke strongly against any attempt to establish a dictatorship, and moved that the house should declare its sittings permanent, and that any attempt to dissolve it should be considered treason.

After the forced dissolution of the Legislative Assembly by the allied troops, La Fayette protested against that violence, and retired to his country residence at Lagrange. In 1818 he was returned, after a great struggle, to the Chamber of Deputies for the department of La Sarthe. During that and the following session he spoke in favour of constitutional liberty, and against exceptional laws.

In 1824 he went on a visit to the United States, where he was received with the greatest enthusiasm. In 1830, being in the House of Deputies, he was foremost among the members who resisted the arbitrary ordonnances of Charles X. He then called out again the national guards, and placed himself at their head. He proposed Louis Philippe as king of the French, stating his conviction that a monarchy based on popular institutions was the government best suited to France. During the trials of the ex-ministers he exerted himself zealously to save them from popular fury. Of the subsequent differences between him and Louis Philippe concerning views of foreign and domestic policy, several versions have been given. La Fayette died at Paris, on the 20th of May, 1834.

FAYETTEVILLE. [CAROLINA, NORTH.]

FAYOUM. [FAIOUM.]

FEALTY, says Littleton (s. 91), 'is the same that *fidelitas* is in Latin. And when a freeholder doth fealty to his lord, he shall hold his right hand upon a book, and shall say thus:—"Know ye this, my lord, that I shall be faithful and true unto you, and faith to you shall bear for the lands which I claim to hold of you, and that I shall lawfully do to you the customs and services which I ought to do, at the terms assigned: so help me God and his saints;" and he shall kiss the book. But he shall not kneel when he maketh his fealty, nor shall make such humble reverence as is aforesaid in homage.'

Fealty is the fidelity which a man who holds lands of another owes to him of whom he holds, and it consists in performing the services for which the land is granted. The law as to fealty continues unchanged, though it is not usual now to exact the oath of fealty. It is due from all tenants of land, except tenants in frankalmoigne and those who hold at will or by sufferance. The reasons for now requiring it are so few that it is nearly gone into disuse, though it serves to keep up the evidence of tenure, when there are no services due. If it is refused, the lord may enforce it by distress.

FEAR, Cape and River. [CAROLINA, NORTH.]

FEAST or FESTIVAL, an anniversary day of civil or religious joy: from the Latin *festum*. Some of the festivals of the Christian church are on a fixed day, as Christmas Day. Some are moveable feasts, as Easter. [EASTER.]

FEATHERS. The principal uses to which feathers are applied are for personal decoration, as plumes for ladies' head-dresses, or for the hats of military officers; as a soft and highly elastic material for filling beds, cushions, and pillows; or, in the case of the larger quill-feathers, as writing-pens, or small tubes for the manufacture of hair-pencils, or similar purposes.

Of the various kinds of feathers employed as plumes for head-dresses the most important are those of the ostrich. They are first washed in a lather of white soap and water, and subsequently in warm clear water. They are bleached by three successive operations: first with water only, then with a little indigo, and then a little sulphur. The feathers are then dried by hanging upon cords, during which they are shaken from time to time to separate their fibres. To increase their pliancy, the ribs are scraped with a bit of glass cut circularly; and, to impart the requisite curly form to the filaments or fibres, the edge of a blunt knife is drawn over them.

Feathers have long been used as a stuffing for beds and pillows; goose feathers especially. Goose feathers are divided into white and gray, the former being deemed the most valuable. The less valuable kind of feathers, known by the general name of *poultry feathers*, are obtained from turkeys, ducks, and fowls. Wild-duck feathers are both soft and elastic, but their value is impaired by the great difficulty of removing the disagreeable odour of the animal oil which they contain. Various methods are practised of cleansing feathers from their oil, principally by the use of lime or lime-water; but Mr. Herring has introduced a method of purifying feathers by steam, which is said to be very efficacious. The softest and finest kind of feathers employed for bedding are those from the breast of the eider-duck, known in commerce as eider-down.

Of the quills of feathers employed for pens, those from the goose are most used. One among many modes of preparing them is the following: a workman sits before a small stove fire, into which he thrusts the barrel of the quill for about a second. Immediately upon withdrawing it from the fire, he draws it under the edge of a large blunt-edged knife called a *hook*, by which it is forcibly compressed against a block or plate of iron heated to about 350° Fahr. By this process the barrel, which is rendered soft and elastic by the heat, is pressed flat, and stripped of its outer membrane, without danger of splitting. It springs back to its natural form, and the dressing is completed by scrubbing with a piece of rough dog-fish skin. The principal workman employed in this operation can pass 2000 quills through his hands in a day of ten hours. By whatever process the external membrane is removed, that inside the quill remains, shrivelled up in the centre of the barrel, until it is cut open to convert it into a pen.

FEBRUARY, the second month of the year. Its name is derived from *februo*, to purify or cleanse. The Saxons called it *Sol-Monath*.

February was not in the Calendar of Romulus. It was added to the year by Numa, who gave it the twelfth place in the Calendar. The Decemviri transferred it to the place in which it now stands. In an ordinary year February has twenty-eight days; in bissextile, or leap-year, it has a twenty-ninth or intercalary day.

FECAMP. [SEINE-INFE'RIEURE.]

FECIA'LES, in ancient Rome, were the messengers or heralds of war and peace; they belonged to the order of the priesthood. They were employed in demanding satisfaction for wrongs done to the Roman state, in declaring war, and in making peace. The rules which regulated their duties formed the Jus Feciale, a kind of Law of Nations in the modern sense.

FEDERATION. This word is derived from the Roman term *fœderatus*, which was applied by the Romans to states which were connected with the Roman state by a *fœdus*, or treaty. A

federal union of sovereign states may be most easily conceived in the following manner:—

We will suppose that the sovereign power in any number of independent states is exercised by some individual in those several states. These sovereign persons may agree respectively with each other and with all not to exercise certain functions of sovereignty in their several states, and to transfer these functions to be jointly exercised by the contracting sovereign persons. The consequence of such a compact will be that the contracting sovereign persons in their joint capacity will become sovereign in each state and in all the states. The several sovereign persons, having for the time surrendered to the joint body certain powers incident to their several sovereignties, are no longer severally sovereign in their several states. The powers surrendered to the joint body may be determined by written contract, the interpretation of which belongs to the joint body, yet in such a manner that there can be no valid interpretation unless the sovereign persons are unanimous; for, if any number or majority could bind the rest, they might, by interpretation, deprive the several contracting persons of all the powers reserved to them by the agreement. It follows also, from the terms of the union, that any one party can withdraw from it at pleasure, and, as far as he is concerned, dissolve the union; for the essence of this union is the continuing consent of all.

This is the simplest possible form of a supreme federal government—one in which the contracting sovereign powers are individuals, and in which the sovereign persons in their aggregate capacity exercise the functions of sovereignty. Such a federation may never have existed; but any federation that does exist, or can exist, however complicated it may seem, is reducible to these simple elements.

The general government of the United States of North America is an example of a federation or federal government, or a supreme federal government. The contracting parties were sovereign states, which had thrown off the supremacy of Great Britain and had become democracies; and in their new capacity of sovereign states, and by means of delegates, they formed a supreme federal government, the nature of which was fixed by a written instrument called a Constitution. The ministers for carrying into effect the federal government are the president and congress, and the judiciary of the United States. By the preamble to the Constitution it is declared that the 'people of the United States' are the contracting parties. The several states of the Union are often still called sovereign and independent states, because they retain all the sovereignty which they have not given up, expressly or by implication, to the general government; and it is considered that the chief business of the general government is to determine and control the relations of all the confederated states to foreign states, and to make provision for the general defence. In practice however great difficulties arise in fixing the limits between the sovereignty of the states, such as it is, and the powers of the general government.

The fifth article of the Constitution provides that 'The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution, or, on the application of the legislatures of two-thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes, as part of this Constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, &c., that no state, without its consent, shall be deprived of its equal suffrage in the senate.' It is assumed by this article that the several states may be bound without their unanimous consent, which is contrary to conditions essentially implied by the nature of the union. This article involves also the inconsistency that the sovereign in any state may bind his successors: if the case of a federation of individual sovereign persons had been that to be provided for, the impossibility of the provision would have been apparent; but the impossibility equally exists when the contracting sovereign powers are not individuals, for the abiding consent is still the essence of the union that has been formed.

Those who wish to examine into the nature of the North American Union and the party questions which have arisen out of the interpretation of the federal constitution may consult the essays of Jay, Hamilton, and Madison in the 'Federalist,' the 'Journal of the Philadelphia Convention,' published in 1819, and Tucker's 'Life of Jefferson' (London, 1836), where they will find ample reference to other authorities.

Federations of a kind existed in ancient times, such as that of the Ionian states of Asia, which assembled at the Panionium at certain times (Herodotus, i. 142); the Achæan confederation [Achæan Confederation]; the Ætolian confederation [Ætolian Confederation]; and the Lycian confederation which is described by Strabo (p. 664). The Roman system of Fœderate States (Civitates Fœderatæ) is another instance of a kind of confederation; but the relationship between Rome and the federate states rather resembled the relation of sovereign and subject than any other, though it was not precisely that.

A supreme federal government, or a composite state, is distinguished by Austin ('Province of Jurisprudence determined') from a system of confederated states: in the latter 'each of the several societies is an independent political society, and each of their several governments is properly sovereign or supreme.' It is easy to conceive a number of sovereign powers, such as the German states, assembling and passing resolutions which concern all the members of the confederacy, and yet leaving these resolutions to be enforced in each state by its own sovereign power. Such a union therefore differs essentially from a supreme federal government, which enforces its commands in each and all the states. As to the existence of a written constitution, as it is called, in the one case, and a mere compact in the other, that makes no essential difference; for the federal constitution, as we have

shown, is merely articles of agreement, which only derive their efficacy from the continued assent of all the members, that contribute in their aggregate capacity to form the sovereign power in such federation.

FEDERI'CI, CAMILLO, an Italian dramatic writer (born at Garessio in Piedmont, April 9th, 1749), whose real name was Giovanni Battista Viassolo. Intended by his family for either the church or the bar, he took to the stage, and after being some years in different companies in the double capacity of a performer upon the stage and a writer for it, he had, in 1777, the good fortune to find an excellent wife in the widow of Vicenzo Bazzigotti. Federici soon afterwards quitted the 'boards,' and settled at Padua, where he employed himself in composing a succession of new pieces for the theatres of both that city and Venice. The juncture was a favourable one, for Goldoni's popularity was upon the wane, Gozzi [GOZZI, CARLO] had ceased to write for the stage, and Chiari was altogether forgotten. Without treading in the footsteps of Goldoni, Federici showed himself a worthy successor to him, inferior in comic force, but equally fertile in invention, and more varied in his subjects. Federici's fame was not confined to the applause of the public whose favour he had more immediately in view, for his pieces were brought out with equal success in almost every theatre throughout Italy. In 1791 he was attacked by a malady of the chest, that rendered him incapable of all exertion, either bodily or mental, but he survived till December 23rd, 1802, leaving a more unblemished moral character than can usually be claimed for writers of his class. The most complete collection of his works is that published under the title of 'Opere Teatrali di Camillo Federici,' Padova e Venezia, 1802–16, in fourteen volumes.

FEDOR IVANOVICH, the last tzar of Moscow of the dynasty of Ruric, ascended the throne in 1584, after the death of his father, the celebrated tyrant Ivan Vasilevich. It was during Fedor's reign that the peasants of Muscovy, who had hitherto enjoyed personal liberty, and could pass from the estate of one landowner to that of any other who would grant them better conditions, were converted into serfs attached to the ground (servi glebæ adscripti). The conquest of Siberia, which had been commenced under Ivan Vasilevich, was completed under Fedor, during whose reign Russia made the first attempt to extend its influence over the Caucasian regions. The khan of Crimea invaded Russia, and penetrated to the capital, but he was repulsed from the walls of Moscow in 1591. The most important event of Fedor's reign was his attempt to get himself elected king of Poland in 1587, in which he failed, and Sigismund Vasa, prince of Sweden, was chosen. Fedor died in 1591.

FEDOR ALEXIEWICH, tzar of Moscow, the eldest brother of Peter the Great, ascended the throne after the death of his father Alexius Michaylowich, 1676, being only 19 years of age. Fedor distinguished his reign particularly by putting an end to a most absurd custom which had acquired the force of law in Muscovy. According to this custom, called Mestnichestvo (literally *placeship*, from *mesto*, place), no member of a great family could be put under the command of, or give precedence to, a person whose birth was considered inferior to his. This abolition took place in 1681, and since that time the nobles of Russia have equal privileges. Fedor died in 1682, at the age of 25.

FEE. [FEUDAL SYSTEM; FEOFFMENT.]

FEES, certain sums of money claimed as their perquisite by official persons under the authority of various acts of parliament, and by prescription. The right to fees, as well as the amount payable in most cases connected with the administration of justice, has been regulated by several recent statutes.

Officers demanding improper fees are guilty of extortion.

The rewards paid to barristers and physicians, attorneys and surgeons, for their several services, are called fees, which may be recovered by the two last-named by action; but barristers and physicians cannot recover their fees by legal proceeding.

FEHME, or FEHMGERICHT, a celebrated secret association of Germany, of which the origin is carried back, though on doubtful authority, to the time of Charlemagne, but which flourished, and was possessed of extraordinary powers, in the fourteenth and fifteenth centuries. The sittings of these tribunals were confined to Westphalia, but the Emperor of Germany was nominally and sometimes actually their head, either by himself or a nominee, and for some time the Archbishop of Cologne was regularly appointed the imperial lieutenant. The society consisted of tribunal lords; counts or judges; and schöppen, or assessors. They were sworn to secrecy, and to execute the orders of the tribunals. The tribunals took cognizance of almost all crimes or injustice, and particularly of such as the law failed to reach. The accused was summoned in a mysterious manner to attend before a tribunal, and if he failed to attend, or was condemned, whenever three of the schöppen (for that was the number necessary for an ordinary execution) afterwards met the person condemned, they seized him, and with one of the ropes which they carried in their sleeves, hung him on the next tree, fixing a dagger in the trunk to denote that the deceased was killed by the holy tribunal. Every schöppe, though he were the father or son of the criminal, was duty-bound to put him to death by the rope, the dagger, the sword, or even poison.

The power of this tribunal was greater than that of the Holy Inquisition; it struck terror into all Germany, and especially in Westphalia, where it originated; but, towards the end of the fifteenth century, the German empire having acquired more political consistency, it gradually lost its power, without being abolished by any legislative enactment. Göthe has given the most graphic picture of the working of this tribunal in his historical drama 'Goetz von Berlichingen;' and Sir Walter Scott, in his 'Ann of Geierstein,' has made use of its traditions; but his tale has no pretensions to historical accuracy. The best historical account

of its organization is by Paul Wigand, 'Die Fehmgerichte Westphalens,' Hamm., 1827.

FEIGNED DISEASES. There are few subjects attended with more difficulty than the detection of feigned diseases, especially when they are the result of a system which permits of a constant refinement of the deceit by practice. This has been especially the case in France, where the object has been to escape the conscription. Foderé has observed, 'that it was brought to such a perfection as to render it as difficult to detect a feigned disease as to cure a real one.' The motives which usually lead to this practice are—1, A release from obligation. This is frequently the case in the army and navy, where the men will pretend to be ill to escape duty or to gain their discharge. This is called *Malingering*. 2, The hope of gain. 3, To procure release from confinement or an exemption from punishment, &c. To these may be added the love of exciting the sympathy or gaining the attention of others, where no hope or need of gain exists. This motive acts in all classes of society, and leads individuals of otherwise the highest moral character to imitate all forms of disease.

There is no natural limit to diseases which may be feigned; but some, being much more easily imitated than others, and less easily detected, are most frequently assumed. Feigned diseases may be divided into, 1, those which are obvious to the senses; 2, those depending upon the description of the impostor; and, 3, those of a complicated nature, presenting symptoms of both kinds. Amongst diseases obvious to the senses are an increased or diminished size of parts, wounds, malformations, ulcers, discharges, spasmodic and paralytic affections. A variety of practices are had recourse to for the purpose of imitating these diseases. The skin is coloured by various agents, or escharotic substances are applied to it.

The spasmodic diseases to which the system is subject have been imitated with great success, and none more so than epilepsy. It has for its peculiar recommendation, that the person who is subject to it may be well at intervals and assume the attacks when it best suits him. The best criterion of imposition is the want of the total insensibility which characterizes the true fits. In the feigned disease the application of stimulants will seldom fail to elicit indications of sensibility. Hartshorn or burning sulphur may be introduced under the nose; alcohol and turpentine may be dropped into the eye, and mustard or common salt placed in the mouth. Pricking the skin with sharp-pointed instruments has also been recommended. Hysteria, catalepsy, tetanus, hydrophobia, some forms of tonic spasm, stammering, strabismus, and difficulty of swallowing, are other diseases of the nervous system which are often imitated. Paralytic affections are also frequently simulated. The treatment resorted to for the cure of these diseases, when natural, would be found a trying ordeal for most impostors.

Another class of feigned diseases are those which depend chiefly upon the description given by the impostor. These are all embraced in increased and diminished sensations. Increased pain of one or many organs is commonly feigned. It is easily assumed, but not easily detected, as many pains, such as that of tic douloureux, come on in an apparently healthy state of the system; and many pains of a severe character are dependent on exceedingly obscure causes. Deafness is often assumed, but it may be detected by unexpectedly or sharply calling out the name of the individual, by calling him by name when asleep, or letting a piece of money fall close to him. Dumbness has been successfully feigned, and cases are recorded which resisted every attempt at discovery. It may be frequently detected by giving the person a sudden and unexpected knock, or a prick with a pin.

Sometimes general diseases are assumed, embracing a collection of symptoms. Of these, the most frequently assumed are fever, ague, rheumatism, phthisis, asthma, dyspepsia, jaundice, inflammations of the bowels, stomach, and kidneys. These feigned diseases are only to be detected by a knowledge of the real diseases, when a correct diagnosis is not often difficult.

The following general rules for detecting feigned diseases have been given by Zacchias:—

1. The first is, that the physician must in all suspected cases inquire of the relatives and friends of the suspected individual what are his physical and moral habits. He must ascertain the state of his affairs, and inquire what may possibly be the motive for feigning disease, particularly whether he is not in immediate danger of some punishment from which this sickness may excuse him.

2. Compare the disease under examination with the causes capable of producing it—such as the age, temperament, and mode of life of the patient. Thus artifice might be suspected if a person in high health and correct in his diet should suddenly fall into dropsy or cachexia; and again if insanity should suddenly supervene without any of its premonitory symptoms. It is contrary to experience to find such diseases occur without some previous indications.

3. The third rule is derived from the aversion of persons feigning diseases to take proper remedies. This indeed will occur in real sickness, but it rarely happens when severe pain is present. Anything that promises relief is generally acceptable in such cases; those on the contrary who feign delay the use of means.

4. Particular attention should be paid to the symptoms present, and whether they necessarily belong to the disease. An expert physician may thus cause a patient to fall into contradiction, and lead him to a statement which is incompatible with the nature of the complaint. To effect this it is necessary to visit him frequently and unexpectedly.

5. The last direction is to follow the course of the complaint and attend to the circumstances which successively occur.

(Beck's *Medical Jurisprudence;* Thomson's *Lectures on Medical Jurisprudence;* Guy's *Principles of Forensic Medicine.*)

FEIZABAD. [BADAKSHAN.]

FELEGYHA'ZA, a market town, and the capital of the Hungarian district of Little Cu-

mania, situated on the high road between Pesth and Temeswar, in the middle of a fertile country, in 46° 43′ N. lat., and 19° 52′ E. long. It contains a population of about 15,000. There is a Roman Catholic church, a gymnasium, and a very handsome building in which the Cumanian courts of justice are held and the public archives kept. Roman urns have been found in the vicinity of the town. The cattle markets held here are considerable.

FE′LIDÆ (from *Felis*, a cat), the *Cat Kind*, a family of the *Carnivora*, in which the organs of destruction (viz. the teeth and claws) are at the maximum of development with the appetite for slaughter in due accordance.

Dentition.—The incisors are small, six above and six below, the canines are very large, conical, compressed, somewhat curved, and sharp-pointed; the false molars are sharp and compressed. In the upper jaw there are two on each side, the first very small, the second long and conical, then comes the laniary molar (*carnassière*), which is bicuspid, with an inner blunt tubercle; behind the laniary is a very small tuberculous molar. In the lower jaw this is wanting, and the first false molar is nearly as large as the second; the laniary molar has no blunt inner tubercle. The dental formula stands thus:—

$$\text{Incisors, } \frac{6}{6}\text{; Canines, } \frac{1—1}{1—1}\text{; Molars, } \frac{4—4}{3—3} = 30.$$

The molars in their respective action upon each other work like the blades of a pair of shears. The condyles of the lower jaw are transverse, and received into deeply channelled glenoid cavities which almost locks them in, so that lateral motion of the lower jaw is impossible.

The orbit is large and open; the zygomatic arch bold and strong; the palate broad between the last molar teeth; the lower jaw strong and thick; the space for the temporal muscles ample. The top of the skull from the nasal bones to the occiput is a long arch; and the *crista occipitalis* forms a sharp prominent bony ridge continued anteriorly along the junction of the two parietal bones, and separating between the vast temporal muscles which originate on each side from it. The muzzle is short and abrupt. Cats carry away their food to some retreat in order to devour it; hence the muscles of the neck and fore quarter are especially powerful, and enable them to lift or drag bodies of great comparative bulk and weight. If we turn to the limbs of the Felidæ, and especially the fore limbs (take the lion or the tiger as an example), we behold a magnificent display of muscular development. They bound from ambush on their prey and dash it to the ground; they strike, and, throwing out their claws as they strike, lacerate their prostrate victim. These claws or talons are retractile within a sheath, which protects them from becoming worn and blunted. There are five toes on the anterior and four on the posterior extremities; these are armed with the formidable claws, which, by an admirable arrangement of the bones, ligaments and muscles, are capable of being brought at once into sudden action, and, that action over, of rolling involuntarily back into their sheaths. This involuntary retraction, counteracted only by the action of muscles, is effected by two elastic ligaments, so contrived as to roll back the ultimate phalanx which the claw encases, and bring it down by the side of the penultimate phalanx, which is flattened on that side, so as to allow it to pass unobstructed. From this retracted position within a flexible sheath, the talon is brought forward by the powerful action of the flexor muscles, which counteract that of the double elastic spring, which in its manner of acting is analogous to a spiral bellwire spring. If the foot of domestic cats be examined, our description will be better understood. The toes moreover are lifted from the ground by elastic pads of cellular tissue. There is a large basal or palm-pad, and one under each toe; these give noiselessness of tread, and conduce to ease and elasticity of progression. The limbs of the Felidæ are short, the joints well knit but supple, and every motion is free, easy, and graceful; they bound along, and they leap with great velocity, and most of them climb trees with the utmost address; they swim vigorously, though generally speaking not partial to water; nevertheless, the tiger will cross rivers, and swim across creeks from island to island. Vigour and agility characterize these terrible beasts of prey. ‘The back and loins are long; the vertebræ of the neck are remarkably large and solid, the first or atlas having its lateral processes flat and expanded; the spinous processes of the dorsal vertebræ are long, with the exception of the last two or three; the transverse processes of the lumbar vertebræ are large; the spinous processes are broad, but rather short, and inclined gently forwards, but become as they advance towards those of the dorsal vertebræ more upright, while those of the dorsal, in descending, lose their obliquity; the chest is deep, the scapula is broad with a high strong spine; the clavicle is small, and merely imbedded in the muscles of the shoulder, the humerus is short and stout; it is remarkable for a high ridge or crest, which rises above the outer condyle of its lower articulation; above the inner condyle there is an orifice for the passage of the artery, which does not run round the bone, but, as it were, pierces it in a direct course onwards. This orifice is found, not only in all the Felidæ, but in some of the American monkeys, in the seals, the badgers, the coatis, the racoons, the mustelæ, the civets, the ichneumons, and others, but not in the dog, the hyæna, or the bear.’

The digestive organs are simple; the intestines short; the veins on the outer surface of the kidneys are very numerous and beautifully ramified. For further particulars see ‘Dictionary of Comparative Anatomy.’

With respect to the senses in the Felidæ, their respective developments are in accordance with the habits and instincts of the race.

Sight.—This sense is acute in the Felidæ, and they have the nictitating membrane very large and moveable. The pigment, as far as is known, is generally speaking of two colours, and the anterior perforation of the iris is formed of segments of two large circles joined, giving it a long and, short axis, the long axis being vertical. John

Hunter remarks that, when the pigmentum is of more than one colour in the same eye, the lighter portion is always placed at the bottom of the eye in the shape of a half moon, with the circular arch upwards; the straight line or diameter passing almost horizontally across the edge of the optic nerve, so that the end of the nerve is within this lighter-coloured part, which makes a kind of semicircular sweep above it; and he observes, that the shape is peculiar to the lion, cat, dog, and most of the carnivorous tribe. The eyes are placed obliquely, and glare in the dark, owing to the brilliancy of the tapetum lucidum. The *Felidæ* have the eyes adapted both for diurnal and nocturnal vision. In the smaller cats the pupil is vertically linear when contracted; but in the lion, tiger, cheetah, jaguar, and leopard, it is circular. It dilates with anger, and at night.

Hearing.—The sense of hearing is very perfect in the cat tribe generally; the *tympanic bulla* below the auditory orifice of the skull is large and convex.

Smell.—The Felidæ enjoy this sense to a very considerable degree of perfection; the olfactory apparatus is developed to the utmost within the limited space allotted to it, yet the Felidæ are not equal in their sense of smell to the canine race. The ethmoïd bone is very complicated, both in regard to the elegant structure of its cribriform lamillæ and the convolutions of its turbinated portions.

Taste.—The sense is not very refined: cats cannot be said to masticate their food; their trenchant molars merely divide the masses of flesh which they tear from their prey into morsels of convenient size for being swallowed and submitted to the action of the gastric juice in the stomach. The roughness of a domestic cat's tongue is familiar to every one, as well as the action of lions and tigers in licking the bones of their prey, in order to detach any fragments of flesh that may be adhering thereto. This is effected by numerous horny papillæ, which are differently arranged in different species, some having them in rows, others in alternate lines; but in all the points are directed backwards.

Feeling.—In the cat tribe the long bristles, called whiskers, on each side of the mouth, are in a certain sense organs of touch. They rise from a close array of glands under the skin, and each is connected with a nerve; hence they communicate to the animal an impression from the slightest touch. Their chief service appears to be to assist these animals in making their way cautiously and noiselessly through dense brushwood or jungle, or through narrow caves or other recesses, aiding the sight during the hours of darkness.

The osteology of the Felidæ presents little for the distinction of species, except size; and in no animals does specific character depend upon size and colour more entirely than it does in this family. There are, indeed, differences; such, for instance, as that pointed out by Mr. Owen between the skull of the lion and that of the tiger; but, taken as a whole, the skeleton of a cat is very nearly the miniature representation of that of a lion or a tiger. We accordingly find that the disposition of many leading zoologists has been to bring all the numerous species under one genus. Linnæus arranges them under *Felis*, the third genus of his order *Feræ*, placing them between the dogs (*Canis*) and *Viverra*. Illiger assigns to them a position in his order *Falculata*, with the title *Sanguinaria*. Cuvier places them under the name of *Les Chats* (*Felis*, Linn.) among his *Carnivores*, the third family of his *Carnassiers*, between the *Hyænas* and the *Seals*. Temminck regards the genus *Felis* as an indivisible group zoologically, but separates them into two sections, the first comprising those which are found in the Old Continent and its Archipelagos, the second those which occur in the New World. C. L. Bonaparte, prince of Musignano, admits into his family *Felina* the genera *Proteles*, *Hyæna*, and *Prionodon*, a very questionable admission. Dr. Leach gives the *Lions* a generic distinction with the name of *Leo*. The *Lynxes* are separated as a genus by Mr. Gray, under the title of *Lynchus*; and the *Hunting Leopard*, *Felis jubata*, is characterized, generically, by Wagler, as *Cynailurus*. The whole family may be popularly divided into Lions, Tigers, Leopards, Lynxes, and *Wild Cats*, or *Cats* properly so called, the two latter terms being more particularly applicable to the smaller forms.

Geographical Distribution of the Felidæ.—The form is widely spread over the face of the earth, but reaches its most powerful development in the warmer climates. With the exception, however, of Australia and the islands of the Southern Pacific, species are found in every part of the world, excepting the arctic regions; and some extend far beyond the limits of moderate temperature, and even into districts where the severity of the cold is almost arctic. No species has yet been discovered common to the Old and New World.

Cats.

Among the smaller species of the great feline family, our attention is naturally first directed towards that domestic animal which is to be found in almost every house. By many writers this animal is regarded as the reclaimed descendant of the European Wild Cat (*Felis catus*, Linn.; *Felis sylvatica*, Merrett). To this theory we cannot agree; for, at the very time when the wild cat abounded in our island, the tame cat was both rare and dear, which would not have been the case when wild broods of young might have been procured with the greatest facility. We do not find the tame domestic cat among the animals enumerated by Cæsar as possessed by the ancient Britons in his day.

We insert the following from Pennant, though it has been often quoted, not only as illustrating the manners of a period so distant as that of *Howel*, who died in the year 948, after a reign of thirty-three years over South Wales and of eight years over all Wales, but also on account of the reflection at the end, which we think worthy the consideration of those who are interested in inquiring whence the stock of the domestic cat was derived. 'Our ancestors,' says Pennant, 'seem to have had a high sense of the utility of this animal. That excellent prince, Howel Dda, or Howel

the Good, did not think it beneath him, among his laws relating to the prices, &c., of animals ('Leges Walliæ,' pp. 247, 248), to include that of the cat, and to describe the qualities it ought to have. The price of a kitling before it could see was to be a penny; till it caught a mouse, twopence. It was required, besides, that it should be perfect in its senses of hearing and seeing, be a good mouser, have the claws whole, and be a good nurse; but, if it failed in any of these qualities, the seller was to forfeit to the buyer the third part of its value. If any one stole or killed the cat that guarded the prince's granary, he was to forfeit a milch ewe and its lamb, or as much wheat as, when poured on the cat suspended by its tail (the head touching the floor), would form a heap high enough to cover the tip of the former. This last quotation is not only curious, as being an evidence of the simplicity of ancient manners, but it almost proves to a demonstration that cats are not *aborigines* of these islands, or known to the earliest inhabitants. The large prices set on them (if we consider the high value of specie at that time), and the great care taken of the improvement and breed of an animal that multiplies so fast, are almost certain proofs of their being little known at that period.' ('British Zoology.')

That a domestic cat was common in ancient Egypt we have abundant proofs in sculpture, paintings, and mummies embalmed with care. It was a sacred animal, and Diodorus relates an instance, which he witnessed, of a Roman being put to death by the populace for having involuntarily killed a cat. There is reason also to believe that it was trained to assist the fowler in the capture of birds. In the British Museum is preserved an ancient Egyptian picture, in which a cat is represented as being thus engaged, the fowler being in a boat on the water, most probably at the entrance of a decoy. ('Egypt. Antiq.,' vol. ii. pp. 58, 59.)

This Egyptian cat, as its remains seem to prove, was identical with a species discovered by Dr. Rüppell in Nubia, and termed by him *Felis maniculata;* it is of the size of a moderate domestic cat, with a long tail, and having the foot, soles, and hind part of the ankles and wrists, shining black. In general colouring it closely approaches that of our gray-brown striped tabby cats. This species M. Rüppell regards as positively identical with the domestic cat of the ancient Egyptians; M. Temminck is of the same opinion; indeed, the skeleton of a mummy-cat and that of *Felis maniculata* have been found to agree precisely. The question then arises, whether this domestic cat might not have been transferred or bequeathed to the contemporary civilized Europeans by the Egyptians, and so have gradually passed westward, at length reaching our island. The zoologists of the Frankfort Museum agree that the general facts strongly favour the opinion that the *Felis maniculata* is the type of our domestic cat. We lean ourselves (having examined the species in question) to this hypothesis. We acknowledge that the domestic cat not unfrequently emancipates itself, and leads in the woods an independent life; but this proves only that the cat retains, as we know it does, a great portion of its wild nature uneradicated by domestication. Moreover it is possible that crossings have occasionally taken place between the domestic cat and the true wild cat; if so, as these crosses breed between themselves, the theory of the non-intermixture of species receives a mortal blow. Mr. Bell however denies that such intermixture has ever taken place.

We shall not attempt to describe the domestic cat, which in all probability we ought to term *Felis maniculata*, var. *domestica*. Its variations of colour, size, &c., are known to all, as are also its habits and manners. Let us, then, at once proceed to a typical form of this section of the Felidæ—the true Wild Cat.

The Wild Cat (*Felis catus*, Linn.) is the *Chat Sauvage* of the French, *Gato Montis* of the Spaniards, *Wilde Katze* and *Baumritter* of the Germans, *Vild Kat* of the Danes, and *Cath goed* of the ancient British. Note that in all these terms the Latin *Catus* and *Catulus* is their root, leading us to the idea that northern and western Europe received the cat through Roman civilization.

Description.—Head triangular, strongly marked; ears rather large, long, triangular, and pointed. Body strong, rather more robust than that of the domestic cat. Tail of equal size throughout its length, or rather larger towards the extremity. Fur soft, long, and thick; colour of the face yellowish gray, with a band of black spots towards the muzzle; whiskers yellowish white; forehead brown; head gray, marked with two black stripes passing from the eyes over and behind the ears; back, sides, and limbs gray, darker on the back, paler on the sides, with a blackish longitudinal stripe along the middle of the back, and numerous paler curved ones on the sides, which are darker towards the back, and become obsolete towards the belly, which is nearly white. Tail annulated with light gray and black; tip of the latter colour. Feet and insides of the leg yellowish gray; soles black, at least in the male, of which Temminck declares it to be a peculiarity. Colours of the female paler, and markings less distinct. Dimensions differing greatly, according to the statement of various naturalists. Medium size of full-grown male:—

	Foot.	In.	Lines.
Length of head and body . .	1	10	0
„ of head	0	3	8
„ of ears	0	2	3
„ of tail	0	11	2

Female rather smaller. (Bell.)

Temminck gives the average length as three feet.

Locality.—All the wooded countries of Europe, Germany especially, Russia, Hungary, the north of Asia, and Nepâl. The animal is larger in cold climates, and its fur is there held in higher estimation.

In Britain it was formerly plentiful, and was a beast of chase, as we learn from Richard the Second's charter to the Abbot of Peterborough, giving him permission to hunt the hare, fox, and wild cat. The fur in those days does not seem to have been thought of much value; for it is ordained in Archbishop Corboyl's canons, A.D. 1127, that no

abbess or nun should use more costly apparel than such as is made of lambs' or cats' skins.

Wild Cat (*Felis catus*).

The Wild Cat is now rarely found in the south of England, and even in Cumberland and Westmorland its numbers are very much reduced. In the north of Scotland and in Ireland it is still abundant.

Among the foreign wild cats may be enumerated *Felis Chaus*, Guld.; the *Mota Rahn Manjur* or *Larger Wild Cat* of the Mahrattas (a lynx); and *Felis torquatus*, F. Cuv.; the *Lhan Rahn Manjur* or *Lesser Wild Cat* of the Mahrattas; *Felis Moormensis*, the *Moormi Cat*, Hodgson, from the Moormi Hills, in Nepâl ('Zool. Proc.,' January 1824). *Felis planiceps*, Vigors and Horsfield, departs in many points from the true cats, and approaches *Prionodon* in others. *Felis Temminckii* of the same zoologists, which is near the domestic cat in size, comes nearer in form—it is uniform in colour—to the true *Tiger Cats*. We must not omit to notice the *Felis Caffra*, a specimen of which is to be seen in the South African Museum (No. 28), specimens of which have been met with, as the Catalogue informs us, in whatever direction South Africa has yet been explored. 'It exhibits certain fixed peculiarities which unequivocally constitute it a distinct species from the domestic cat, which is occasionally found wild in the colony, and with which the former has sometimes been erroneously confounded.'

Fossil Felidæ.

In the second or Miocene period of the tertiary formations we have hitherto found the first traces of large fossil cats. There are no less than four species of these great cats, some as large as a lion, enumerated by Professor Kaup from the Epplesheim sand near Altzey, about 12 leagues south of Mainz. These remains are preserved in the museum at Darmstadt. The professor names these *Felis aphanista*, *F. prisca*, *F. ogygia*, and *F. antediluviana*. In the third and fourth (or Pliocene) divisions of the tertiary periods, we find that the number of terrestrial herbivorous quadrupeds become more abundant; and, with their numerical importance, the *Carnivora*, whose agency was required for keeping them down, increase also. The remains of *Felidæ* occur in the ossiferous caverns, such as those of Kirkdale, Gailenreuth, &c.; and also in the osseous breccias (Nice, &c.) In the cave at Kirkdale the only remains that had been found of the tiger species, according to Dr. Buckland, were two large canine teeth, each 4 inches in length, and a few molar teeth: these exceeded in size those of the largest lion or Bengal tiger. Mr. Cottle of Bristol procured from Oreston Cave, Plymouth, among many other remains, two tusks of a tiger, one $3\frac{3}{4}$ inches long, the other $3\frac{1}{4}$, one from the upper, and one from the lower jaw. Dr. Buckland in the same work ('Reliquiæ Diluvianæ') mentions that Cuvier had then lately found the tusks of an extinct lion or tiger in the breccia of Nice, and that Mr. Pentland had discovered the tooth of the same extinct tiger in the breccia of Antibes. Bavard, the Abbé Croizet, and Jobert, in the work on Fossil Cats, found, among the remains contained in the ossiferous rocks of Auvergne (Puy de Dôme) the following species: *Felis Issidoriensis*, *F. brevirostris*, *F. pardinensis*, *F. Avernensis*, and *F. megantereon*.

FELIPE, SAN. [Venezuela.]

FELIS. [Felidæ.]

FELIX I., II., III., IV. [Pope.]

FELIX V. [Amadeus VIII.]

FELLETIN. [Creuse.]

FELLOWSHIP, in books of arithmetic, is the rule by which profit or loss is divided among those who are to bear it, in proportion to their investments or interests in the transaction.

FELLOWSHIP is the condition of a Fellow; and a Fellow of a College is generally a member of a corporate body, entitled to a share of the revenue, and to participate in the government of the college. His rights and duties are determined by the regulations of the founder of the college or the fellowship. Fellowships are either original, that is, part of the foundation of the original founder, or endowed by subsequent benefactors of a college already established. Where the number of fellows is limited by the original foundation, new fellows cannot be made members of the corporate body without a new incorporation. If the number is not limited by the charter, it seems that the corporation may admit new fellows as members, who will be subject to the statutes of the original foundation in all respects. Graduates of each several college are in general only eligible to fill a vacant fellowship in the establishment, and they are elected after having undergone an examination by the master and fellows or by the master and senior fellows. But in some cases special rules which control the election prevail, as where the fellow must be of the blood of the founder, or where he must be a native of a particular county, &c., and in some few cases fellowships are open to the graduates of several colleges, or even a whole university. The rules as to the election of fellows are prescribed by the founder, modified in some cases by the by-laws of the several colleges. Some fellowships may be held by laymen, but in general they can be retained only by persons already in holy orders, or who are ordained within a specified time. Fellowships are of unequal value, varying from 30*l.* and less to 250*l.* a year and upwards, the senior fellowships being in general the most

lucrative; but all confer upon their holders the right to apartments in the college, and certain privileges as to commons, or meals. They are in general tenable for life, unless the holder marries, or inherits estates which afford a larger revenue, or accepts one of the livings belonging to the college which cannot be held with a fellowship. The condition of celibacy is attached to all fellowships, but it is not peculiar to them; for instance, by the statutes of the founder of Harrow school, the head master ought to vacate his mastership upon marriage, just as in the case of a fellowship. The college livings are conferred upon the fellows, who in general have the option of taking them in order of seniority.

FELLTHAM, OWEN, lived in the time of James I., but the particulars of his life are entirely unknown. To the lovers of English literary antiquities he is known as the author of a curious book called 'Resolves,' consisting of pious and moral treatises collected into *centuries*. It exhibits an exuberance of wit and fancy perfectly astonishing. An excellent account of the book, with copious extracts, will be found in the *Retrospective Review*, vol. x.

FELO-DE-SE (a felon of himself) is a person who, being of sound mind and of the age of discretion, deliberately causes his own death; and also in some cases, where one maliciously attempts to kill another, and in pursuance of such attempt unwillingly kills himself, he is adjudged a felo-de-se. (1 Hawkins, 'P. C.' c. 27, s. 4.) When the deceased is found by the coroner and jury a felo-de-se, all his chattels, real and personal, are forfeited to the crown, though they are, it is said, usually restored upon payment of moderate fees. It follows from this rule, that a will made by a felo-de-se is void as to his personal estate, though not as to his real estate, nor is his wife barred of her dower. Formerly he was buried in the highway with a stake driven through his body. But, by 4 Geo. IV. c. 52, it is provided that a felo-de-se shall be privately interred at night in the burial-ground in which his remains might by law have been interred if the verdict of felo-de-se had not been found against him.

FELONY. [Law, Criminal; Attainder; Descent; Escheat; Forfeiture.]

The distinction formerly made between felony with and without benefit of clergy is explained in Benefit of Clergy.

FELSO-BANYA. [Szathmar.]

FELSPAR, a mineral which occurs crystalline and massive. The primary form of the crystal is an oblique rhombic prism. Colour white, gray, green, red, of different shades. Transparent, translucent, or opaque. *Adularia* and *Moonstone* are two varieties. The massive varieties are amorphous, and have a granular compact structure. Felspar, which is a component of all granites, consists mainly of silica and alumina.

FELT. [Hat; Woollen and Worsted Manufactures.]

FELTON. [Buckingham, Duke of.]

FELTRE. [Belluno.]

FELUCCA (*Felúca* in Italian, *Felouque* in French, *Falúca* or *Falúa* in Spanish), a vessel or small craft used in the Mediterranean for coasting voyages, being propelled both by oars and sails. The feluccas carry two masts, main and fore, with lateen sails.

FEME COVERT, FEME SOLE. [Wife.]

FEMERN. [Schleswig.]

FENCES. When a park is inclosed to keep in deer and game, the best fence is a stone or brick wall, well built with lime mortar; but, as this is expensive where stone and lime are not at hand, the common *park paling* is more frequently met with. This is composed of posts and rails of oak morticed and pinned together, and split pales of the same material nailed upon these in an upright position. Sometimes the pales are nailed at a distance from each other, which makes the *open-paled fence*, and the pales are then generally cut to a point at top. Wood fences on the continent are generally of ruder construction.

In wild mountain passes in Scotland and Ireland it is usual to separate the properties of different individuals or that of parishes by rough stone walls put together without any mortar. The materials are generally at hand, and a rough and efficient fence is made without much labour. Where stones are not at hand, a high bank of earth faced with sods of grass is substituted for a wall. Furze seed is often sown on it, and soon forms an excellent fence, which, by proper care and clipping, will last a long time. But the most common kind of fence for fields is the hedge and ditch, the bank being raised with the sods and earth taken out of the ditch, and the hedge planted in the side of the bank towards the ditch, or on the top. Where they are not required as drains, it is a great waste of land to have any ditches, and a simple hedge planted on the surface of the soil is much to be preferred. Of all fences a live hedge, which is carefully planted, and kept properly cut and trimmed when it is grown up, is by far the best.

When a fence is required within sight of a dwelling, a deep ditch is sometimes dug, and a fence placed at the bottom of it. This is called a *sunk fence*. Sometimes a wall is built against a perpendicular side of a ditch, and some very light fence is placed obliquely outwards near the top of it, and level with the ground. This is called a *ha-ha fence*, a name given to it from the surprise excited in a person unacquainted with it, when he suddenly finds himself on the top of a wall with a deep ditch before him. A variety of *light fences of iron* have been invented for the same purpose: some of these are fixed, and others moveable: some have upright pieces of cast iron as posts let into oak blocks sunk in the ground, and rods of wrought iron passing through holes in the uprights: some have wire for the same purpose. But the most common iron fence is composed of separate wrought-iron hurdles, which may be moved at pleasure, and are kept together by screwed pins and nuts.

It is usual in England to plant trees in the hedge-rows; and it is owing to this practice that England presents such a rich garden-like appearance, wherever there is a hill which enables one to see any extent of country. But trees are a

great detriment to the farmer; and, where the land is highly manured, the trees draw off much of the rich juices. Stone fences are the least picturesque, but the most profitable.

FENELON, FRANÇOIS DE SALIGNAC DE LAMOTHE, was born at Perigord, in France, in the year 1651. He took orders; and early in life he wrote a treatise 'De l'Education des Filles,' which is well known, and has been translated into our language. He became intimate with Bossuet. Being intrusted by Louis XIV. with a mission to Poitou, to convert the Protestants, he nobly refused the aid of dragoons, and employed persuasion alone as an instrument of conversion. In 1689 he was appointed tutor to the young Duke of Burgundy, which brought him into attendance on the court; and, after he had been tutor for five years, Louis made him Archbishop of Cambray. Almost immediately after his elevation the favour he showed to the quietist doctrines of Madame Guyon led to a quarrel with Bossuet, and brought down on him the censure of the pope. Fenelon on this submitted, signed a renunciation of the doctrines he had supported, and would have been restored to royal favour had not the celebrated romance of 'Télémaque,' which he had written some years before, been published against his will through the treachery of a servant. Several passages in this work were suspected by Louis to be directed against himself. It was suppressed in France, but rapidly circulated in Holland. Fenelon had always conceived it just that the people should have a share in the government, and it was expected that the Duke of Burgundy would have acted in accordance with his preceptor's views. But all hopes of this sort were cut off by the sudden death of that prince. Fenelon himself died Jan. 7, 1715.

The works of Fenelon are very numerous; consisting, besides the romance of 'Télémaque,' of a variety of religious and moral treatises. 'Télémaque' has been translated into every European language, and is read at almost every European school. Had it been written in this age, it is questionable whether its popularity would have been so great. A handsome quarto edition of his works was published at Paris in 1787.

FENESTE'LLA, a beautiful and abundant genus of fossil Zoophyta, allied to *Retepora*, which occurs in the whole Palæozoic series. (Lonsdale, *Silurian System*, &c.)

FENNEL. [Fœniculum.]

FENTON, ELIJAH, was born in Staffordshire in the year 1683. Being designed for the church, he was admitted a pensioner of Jesus College, Cambridge, in 1700. He became secretary to the Earl of Orrery, and afterwards tutor to his son, Lord Broghill. This office lasted for six or seven years, during which Fenton became acquainted with Pope, and assisted him in the translation of the 'Odyssey.' The first, fourth, nineteenth, and twentieth books are said to be the work of Fenton. In 1723 he produced at the theatre in Lincoln's Inn Fields a tragedy called 'Mariamne,' which was so successful that he is reported to have gained 1000*l.* by its representation. He died in 1730.

FENUGREEK. [Trigonella.]

FEODOSIA. [Kaffa.]

FEOFFMENT is a form of transferring a fee-simple in land, or an estate in fee-tail, or an estate for life, which is effected by the person who is in possession (the feoffor) delivering up the possession to another (the feoffee), and expressing at the same time what estate in the land the feoffor intends that the feoffee shall have (Litt. s. 1). Before the enactment of the Statute of Frauds (29 Chas. II. c. 3), no writing was necessary to show for what purpose or for what estate possession was given of the land; but this statute requires a writing, which is usually a deed. There is a copy of an ancient charter of feoffment in the Appendix to the 2nd volume of Blackstone's 'Commentaries.' The giving up of the possession is called Livery of Seisin, the word Seisin being appropriated to signify that possession which is a freehold interest. The word feoffment is undoubtedly formed from feof, fief, feud.

The Livery of Seisin may take place on the land, when the feoffor and feoffee are both present there, by the feoffor declaring his will to be to give up the possession, and by the feoffee in any way showing that he takes possession. It is erroneously said, that the delivery on the land, by the feoffor to the feoffee, of a clod of earth or of a twig broken from the land is a delivery of a symbol of possession. No symbol would satisfy the purpose; the feoffor must actually give up possession, and the feoffee must take possession; and the delivery of a clod of earth on the land is merely one of the modes of showing the intention of the parties, and it is not necessary. (Litt. s. 418.)

A feoffment may be made in view of the land, if the possession is vacant; but the feoffee must take possession, or he will not have got seisin. The writing must express the estate or interest which the feoffor intends to convey to the feoffee; if no quantity of estate is expressed, the feoffee acquires an estate for his life. In order to convey an estate of inheritance, there must be the word 'heirs' in the writing of feoffment.

A man may make livery of seisin by his attorney, and acquire seisin by his attorney. If land is on lease, no livery can be made without the consent of the person who has the lease, and who occupies the land. It is said that the owner of lands of gavelkind tenure may convey them by feoffment at the age of fifteen.

FERÆ (Zoology), the third order of *Mammalia*, according to Linnæus. The following is his character of the order:—Upper incisor teeth (*primores*) six, rather acute (*acutiusculi*); canine teeth solitary. The order contains the following genera:—1. *Phoca* (the Seals); 2. *Canis* (the Dogs, Wolves, Foxes, Hyænas, and Jackals); 3. *Felis* (the Cats, Lions, Tigers, Leopards, Lynxes, and smaller cats); 4. *Viverra* (the Ichneumons, Coatis, Skunk (*Putorius*), Civets, and Genets); 5. *Mustela* (the Otters, Glutton, Martens, Polecats, Ferrets, and Weasels, including the Ermine, &c.); 6. *Ursus* (Bears, Badgers, and Racoons); 7. *Didelphis* (the Opossums); 8. *Talpa* (the Moles); 9. *Sorex* (the Shrews); 10. *Erinaceus*

(the Hedgehogs). Linnæus places the *Feræ* between the orders *Bruta* and *Glires*.

FERDINAND I. of Austria, younger brother of Charles V., born in 1503, was elected king of the Romans during his brother's reign, and succeeded him as emperor in consequence of the abdication of Charles, which was sanctioned by the diet of the empire in 1558. Ferdinand had succeeded in right of his wife to the crowns of Bohemia and Hungary in 1526, but was only enabled to secure them after a long contest, and then succeeded in making those kingdoms hereditary in his family. On being proclaimed emperor after his brother, he became involved in a quarrel with the pope, Paul IV., who refused to crown him upon the plea that the abdication of Charles V. was effected without the consent of the papal see, and required a fresh election to be made. Paul's successor, Pius IV., showed himself more tractable in acknowledging Ferdinand as head of the empire, and it was settled that, instead of the customary form in which the emperor elect professed his obedience to the head of the church, a mere complimentary epistle should be substituted. Thus ended the last remains of that temporal dependence of the German empire on the see of Rome which had been the subject of so many controversies and wars.

Ferdinand continued throughout his reign to hold the balance even between the Protestants and Catholics with regard to their mutual toleration and outward harmony; he even endeavoured, though unsuccessfully, to effect a union of the two communions. The negotiations were still pending when the emperor died at Vienna in July 1564. He left three sons: 1, Maximilian, who succeeded him as emperor, archduke of Austria, and king of Bohemia and Hungary; 2, Ferdinard, whom he made count of Tyrol; 3, Charles, whom he appointed duke of Styria, Carinthia, and Carniola.

FERDINAND II. of Austria, son of Charles, duke of Styria, and grandson of Ferdinand I., succeeded his cousin Matthias in 1619. But the states of Bohemia, who were already in open revolt against Matthias, elected as their king Frederic, Count Palatine, son-in-law of James I. of England, and Hungary joined in the revolt, supported by Bethlehem Gabor, prince of Transylvania. This was the beginning of the Thirty Years' War, a war both religious and political, and one of the most desolating in the history of modern Europe. Hungary and Bohemia were ultimately obliged to submit. Another confederacy was formed against Ferdinand by the Protestant states of Saxony, supported by Christian IV. of Denmark, who put himself at their head in 1625. Ferdinand opposed to him Tilly and Waldstein, or Wallenstein, another commander of extraordinary abilities. In two campaigns the confederates were defeated; Christian was driven into his hereditary states, and the peace of Lübeck, 1629, put an end to the war. Ferdinand now adopted measures of retaliation which drove the Protestants to despair: seven hundred noble families were proscribed, and the common people were forced to change their faith. Above 30,000 families, preferring their consciences to their country, sought refuge in Protestant states. Ferdinand also insisted on the restitution of such ecclesiastical property as the Protestants had seized since the treaty of Passau in 1532, but he failed in carrying this entirely into effect through the resistance of the Roman Catholic princes, who had participated in the spoil, and feared that they might be made as completely dependent upon the emperor as the grandees of Spain had become upon their king. The diet at Ratisbon, on Ferdinand's request that his son Maximilian might be elected king of the Romans, replied by insisting that the emperor should reduce his army and dismiss Waldstein. Soon afterwards Gustavus Adolphus landed in Pomerania, and put himself at the head of the Protestant party in Germany. The events of the memorable campaigns that followed are well known from Schiller's 'Thirty Years' War,' and other historians. [Gustavus Adolphus.] The cause of the Protestants triumphed in Germany until Gustavus fell at the battle of Lutzen, 1632, after which the Swedes and German Protestants continued the war; but the victory of Nordlingen, gained by Ferdinand, eldest son of the emperor, had the effect of detaching the Elector of Saxony from the Swedes, an example followed by almost all the other German states. Ferdinand died in February 1637.

FERDINAND III., son of Ferdinand II., had to continue the war against the Swedes for several years more, until the peace of Westphalia, 1648. This celebrated treaty forms an important epoch in the history of Germany and of Europe. The remainder of the reign of Ferdinand III. was passed in tranquillity. He died in 1657. He was succeeded by his son, Leopold I.

FERDINAND I. of Naples was the natural son of Alfonso V. of Aragon and of Sicily. In 1458, after the death of his father, Ferdinand assumed the crown of Naples. The claim was however contested by John of Anjou, supported by many of the chief barons of the kingdom. Ferdinand subdued them, but his cruelty and treachery to them after their submission perpetuated a feeling of discontent that kept him ever uneasy. Towards the latter end of his reign this was heightened by the knowledge of the preparations of Charles VIII. of France to support his claim to the crown derived from the Anjous, which he had not the means of averting. Ferdinand died in 1494, at the age of 71. He was succeeded by his son Alfonso, a gloomy and cruel prince, who, terrified at the approach of the French, abdicated in favour of his son Ferdinand.

FERDINAND II., found himself occupying a throne threatened by enemies from without and by disaffection from within. The French occupied Naples in 1495, and he asked assistance from Ferdinand V. of Spain, who sent him his great captain, Gonzalo of Cordova, with a body of troops, who soon reconquered the kingdom of Naples. Ferdinand returned to his capital, but died suddenly in 1496, at the age of 28 years. He was succeeded by his uncle Frederic, who was soon afterwards deprived of his kingdom by his ally, Ferdinand of Spain.

FERDINAND III. of Naples. [Ferdinand V. of Spain.]

FERDINAND IV. of Naples, afterwards styled Ferdinand I. of the United Kingdom of the Two Sicilies, born in January 1751, was the son of Don Carlos of Bourbon, king of the Two Sicilies, afterwards Charles III. of Spain. He was little more than eight years of age when his father Charles, being called to the throne of Spain by the death of his brother Ferdinand VI., made over to him the kingdom of Naples and Sicily. In April 1768, Ferdinand married Maria Carolina of Austria, daughter of Maria Theresa, a clever and ambitious princess, who in fact ruled under her husband's name till her death, the king himself being generally passive, and his time being much engrossed by hunting, shooting, and other diversions. The first 30 years of his reign were for Naples years of peace and comparative happiness. Many useful reforms were effected by his ministers, and especially by Tanucci, who continued at the head of affairs till 1777, and Ferdinand was extremely popular, especially with the lower classes.

Caraccioli and others succeeded Tanucci for a short time, until Joseph Acton, an Irishman, obtained an almost unlimited influence [ACTON], and became premier or rather sole minister. His administration was neither so economical nor so wise as that of Tanucci. On the breaking out of the French Revolution, the queen, being the sister of Marie Antoinette, took a decided part against France, and many young men of good family, supposed to favour the opinions of the revolutionists, were arrested, tried, imprisoned, and a few sentenced to death.

The court of Naples joined the first coalition against France in 1792. In 1796 however, alarmed by the successes of Bonaparte, a peace was concluded with the Directory. In 1798, the French having occupied the papal state, the court of Naples formed a secret alliance with Austria, England, and Russia; and the Neapolitan army in November, 1798, marched upon Rome, which it occupied for a few days, when the French attacked and routed several divisions of the Neapolitans; and the rest of the army, with Mack their general and the king himself, fled as fast as they were able to Naples, whither the French followed them closely. The greatest confusion prevailed at the court of Naples; and the royal family left Naples on December 21, 1798, for Sicily. The French, after a struggle with the populace, obtained possession of Naples; but, in the spring of 1799, their reverses in Lombardy obliged them to abandon it, leaving only a small garrison there. Cardinal Ruffo landed in Calabria from Sicily, and preached a sort of political and religious crusade against the French and their partisans, and the whole kingdom was reconquered for Ferdinand in a short time. A dreadful reaction took place, in which thousands lost their lives, either murdered by the royalists, or condemned by the courts instituted to try all those who were accused of republicanism. (See Colletta, 'Storia del Reame di Napoli,' 1834; and 'Sketches of Popular Tumults,' 1837 and 1848.)

Ferdinand returned to Naples, and in 1801 he concluded a treaty of peace with France. In 1805 the court of Naples entered secretly into the coalition against France. The consequence was, that Napoleon, after his victory at Austerlitz, sent a force under Massêna to occupy that kingdom. Ferdinand and his court withdrew to Sicily a second time, where they remained till 1815. But even in Sicily the reign of Ferdinand did not run smooth. The arbitrary and unconstitutional conduct of the queen created extreme discontent, so that at length the English were forced to interfere, and in January 1812 Ferdinand resigned his authority into the hands of his eldest son, Francis. A parliament was assembled, which abolished feudality, and framed a new constitution upon a liberal basis. The queen's influence was now at an end; she embarked in 1813 for Constantinople, whence she went to Vienna, where she died in the following year. In 1814 Ferdinand resumed the reins of government, and opened in person the Sicilian parliament of that year. In 1815, after the defeat of Joachim Murat by the Austrians, Ferdinand was recalled to the throne of Naples, and in June of that year he returned to his old capital. The government of Ferdinand at Naples from 1815 till 1820 was mild, impartial, and orderly. But in Sicily, having dissolved the parliament, he never convoked it afterwards. By a decree of December 1816, he assumed the title of Ferdinand I., King of the United Kingdom of the Two Sicilies, declaring that Sicily and Naples formed no longer distinct states, but were both subject to the same system of government.

In 1820 a revolt, commenced by a regiment of cavalry, but excited and supported by the *Carbonari*, broke out, and, the insurgents being joined by a great part of the army and the people, who demanded a constitution, Ferdinand was forced to concede: the constitution (that of the Cortes of Spain) was proclaimed, and a parliament was convoked at Naples. Meantime the Sicilians, ever jealous of their nationality, demanded a separate parliament for themselves and a repeal of the union of the two kingdoms. The parliament at Naples refused, and a revolt broke out at Palermo, which was put down after much bloodshed. Soon after, the sovereigns of Austria, Russia, and Prussia, assembled at Troppau, wrote to King Ferdinand, inviting him to a conference at Laybach, in Carinthia. After some hesitation permission was given for him to attend, and he proceeded thither in December 1820, leaving his son Francis as his vicegerent at Naples. In February 1821, Ferdinand, by a letter written from Laybach, signified to his son that the allied sovereigns were determined not to acknowledge the actual constitutional government as established at Naples. Soon afterwards the Austrian army passed the Po, moved on towards Naples, and after a slight resistance the Austrians entered Naples at the end of March 1821. Ferdinand soon afterwards returned to his capital on what may be styled his third restoration. The government again became absolute, but not so lenient or liberal as it was before 1820. After reigning four years longer, Ferdinand died suddenly on Jan. 4, 1825. He was succeeded by his son, Francis I.

FERDINAND V. of Castile and II. of Aragon, son of John II. of Aragon, married in 1469 Isabella, daughter of John II. of Castile, by which

marriage those two kingdoms were united. By Isabella he had three daughters: one was Catherine, the wife of Henry VIII.; another, Joanna, married Philip, archduke of Austria, whose son, Charles V., succeeded his mother in the Spanish dominions and his father in the empire.

Ferdinand took from the Moors the kingdom of Granada, their last possession in Spain, in 1492. Columbus discovered for him the New World; his general, Gonzalo of Cordova, conquered for him the kingdom of Naples; and he added Navarra to his other dominions. He was the most powerful monarch of his time, and was also the cleverest; but his abilities were disgraced by a total want of faith and a recklessness of principle. He was ably assisted by his minister, Ximenes [CISNEROS], who emancipated the crown from the power of the feudal nobles by raising troops at the expense of the state, and by favouring the privileges of the municipal towns. Ferdinand established the Inquisition in Spain; which fearful tribunal continued till 1820, when it was finally abolished. He may be considered as the restorer, if not the founder, of the Spanish monarchy. Ferdinand died in January 1516, at sixty-three years of age.

FERDINAND VI., born 1712; succeeded his father, Philip V., in 1746; and died in 1759.

FERDINAND VII., eldest son of Charles IV., king of Spain, and of Maria Louisa of Parma, was born on the 14th of October, 1784. In 1802 Ferdinand married his first cousin, Maria Antonietta, daughter of Ferdinand IV., king of the Two Sicilies, who died, without issue, May 1806.

At this time the administration of Spain was in a wretched state; every thing was done through bribery or favour; the monarchy was sinking lower and lower in the estimation of Europe, having become a mere dependent of France, and the people were highly dissatisfied. A series of intrigues was carried on by the king, the prince, and the minister, the notorious Godoy, and all sought the protection of Bonaparte. These applications were encouraged, and, after some scandalous scenes between the father and son, the whole family were induced to repair to Bayonne and place themselves in the hands of Napoleon. In 1808 both father and son resigned their claims to the crown in his favour. Ferdinand resided at Valençay under a strict surveillance, but the Spanish nation did not submit to the dictates of Napoleon, nor to the commands of the king to transfer their allegiance. In 1813 the reverses of the French both in Spain and in Germany induced Napoleon to restore Ferdinand to the throne of Spain, on condition that he should send the English out of the peninsula, but the Cortes of Madrid refused to ratify the treaty, and wrote to Ferdinand that they would receive him in his capital as their lawful king, provided he would sign the constitution which had been proclaimed at Cadiz in 1812 by the representatives of the nation. Ferdinand set off from Valençay in March 1814; but, instead of proceeding direct to Madrid, he went to Zaragoza, and thence to Valencia, where he was surrounded by a host of people, military and civilians, churchmen and laymen, who were hostile to the constitution, and who advised him to reign, as his fathers had done before him, an absolute king. He annulled the constitution, and amidst plots and strife, proscriptions and civil wars, maintained his position till January 1820. The constitutionalists then obtained an ascendancy. Ferdinand accepted and swore on the 9th of March to uphold the constitution of 1812. For three years it was nominally adhered to by the discontented royalists on the one side, and the not-always prudent constitutionalists on the other. But in the beginning of 1823, at the instigation or at least with the consent of Ferdinand, Louis XVIII. of France sent an army of 100,000 men into Spain under the command of the Duc d'Angoulême, to deliver Ferdinand VII. from the slavery in which he was kept by a factious party, and to restore him to his freedom of action. The English ministry protested against this interference, but it was carried into effect. The Cortes withdrew to Cadiz, carrying the king with them. In the following September the French besieged Cadiz, and after some negotiations Ferdinand was allowed by the Cortes to repair to the French camp to treat with the Duke of Angoulême. The sequel is well known. Ferdinand continued to govern, at least nominally, checked on one side by fear of the liberals, and on the other by mistrust of the violent absolutists, or apostolical party, as it was called. In his latter years Ferdinand seemed to take little or no interest in public affairs, leaving things to go on as they could. Having lost his third wife, who was a Saxon princess, and having yet no children, he married, in November 1829, Maria Christina, daughter of Francis, king of the Two Sicilies, and his own niece by her mother's side. By her he had two daughters—Maria Isabella, now queen of Spain, born 10th of October, 1830, and Maria Luisa Ferdinanda, born 1832, married to the Duc de Montpensier, son of Louis-Philippe, ex-king of the French. Ferdinand died on the 29th of September, 1833.

FERGUSON, ADAM, born in 1724, was the son of a parish minister in Perthshire. He studied at St. Andrew's and at Edinburgh, was ordained, and served as chaplain in a Highland regiment till 1757, when he was appointed keeper of the Advocates' Library of Edinburgh. In 1759 he was made professor of natural philosophy in the college of that city, and in 1764 he was appointed to the chair of moral philosophy, a branch of science to which he had more particularly applied himself. In 1767 he published his 'Essay on the History of Civil Society,' a work which was well received, and which procured him the notice of public men. In 1778 he was appointed secretary to the commissioners who were sent to America in order to try to effect a reconciliation with the mother country,—an office in which Ferguson took a clearer view of the state of the question, and of the temper of the American people, than was common at that time with Englishmen. On his return in 1779, he resumed the duties of his professorship, and in 1783 he published his 'History of the Progress and the Termination of the Roman Republic,' 3 vols. 4to. Ferguson and his contemporary, the French Abbé Auger, were foremost among those

who, previous to Niebuhr, investigated the internal working of the institutions of the Roman republic. [Auger.] In 1784 Ferguson resigned his professorship on account of ill health, and was succeeded by Dugald Stewart. In 1792 he published 'Principles of Moral and Political Science,' being chiefly a retrospect of lectures on ethics and politics, delivered in the College of Edinburgh,' 2 vols. 4to. Another work of Dr. Ferguson's on the same subject, though a more elementary one, the 'Institutes of Moral Philosophy,' which he first published in 1769, has been often reprinted and translated into foreign languages, and has also been adopted as a text-book in some foreign universities. Ferguson died at St. Andrew's in February 1816.

FERGUSON, JAMES, was born in 1710, near Keith, in Banffshire. His father, who was a day-labourer, taught him to read and write, and sent him to school for three months at Keith.

His early taste for practical mechanics and for astronomy, which he studied while herding sheep, was extraordinary. It attracted the notice and received the assistance of Mr. Gilchrist, the minister of Keith. When about twenty, he entered into the service of Mr. Grant of Achoynaney, whose butler, Mr. Cantley, taught him decimal arithmetic and the elements of algebra. After working in the service of one or two more persons, he went to reside with Sir James Dunbar of Durn, and at the suggestion of Lady Dipple, Sir James's sister, began to draw patterns for ladies' dresses, and copied pictures and prints with pen and ink. Having drawn a portrait of Mr. Baird of Auchmeddan, Lady Dipple's son-in-law, which was much admired, he began to draw likenesses from the life in Indian ink: these appeared to his patrons to be so excellent, that they took him to Edinburgh, where he boldly commenced the practice of his art at once. The Marchioness of Douglas having assisted him with her patronage, he succeeded so well that he obtained money enough not only to defray his own expenses, but to contribute largely to the support of his aged parents.

Though he continued to follow this profession for about twenty-six years, he seems never to have given his mind to it. He continued his attention to astronomy, and drew an Astronomical Rotula, for exhibiting the eclipses of the sun and moon, with which Professor Maclaurin at Edinburgh was highly pleased, and caused it to be engraved. It ran through several impressions, till, by the change of the style in 1753, it became useless.

In 1743 he resolved to go to London, where he continued his profession of drawing portraits, but devoted his leisure to astronomical pursuits.

In 1747 he published his first work, 'A Dissertation on the Phenomena of the Harvest Moon.' In 1748 he read lectures on the eclipse of the sun which happened in that year. From this time to the end of his life he continued his lectures, which were numerously and fashionably attended, and wrote several works on astronomy and mechanics, and a treatise on perspective.

Soon after the accession of Geo. III. a pension of 50*l.* a year was granted him out of the privy purse. In 1763 he was elected a Fellow of the Royal Society, and in 1776 he died.

FERGUSON, ROBERT, was born at Edinburgh about the year 1750, and educated at the University of St. Andrew's. After leaving the university he was employed in the office of the commissary-clerk of Edinburgh, with the exception of a few months spent in that of the sheriff-clerk, and was a constant contributor to Ruddiman's 'Weekly Magazine,' from which his poems were afterwards collected. The local celebrity which these productions obtained for him gave him so frequent opportunities of convivial and other excesses as to ruin his health and terminate his life at the early age of twenty-four years. His last days were passed in a mad-house. He was buried in the Canongate churchyard in Edinburgh, where Burns erected a monument to his memory.

Ferguson's poems are written partly in English and partly in Scotch. Those in Scotch are full of humour and of characteristic descriptions of the Edinburgh manners and amusements of the period. Of his English verses little need be said.

FERGUSONITE, a crystallized mineral, which is principally a columbate of yttria. The primary form is a prism; colour, brownish black; nearly opaque; specific gravity, 5.8.

FERISHTA (Mohammed Kasim), a Persian historian, was born at Astrabad, on the border of the Caspian Sea, in A.D. 1570. His father, whose name was Gholam Ali Hindoo Shah, left his native country when Ferishta was very young, and travelled into India. He finally settled at Ahmednugger, in the Deccan, during the reign of Murtuza Nizam Shah, and was appointed to instruct Mîran Hossein, the son of Murtuza, in the Persian language, but he died soon after this appointment. Mîran Hossein, however, patronized his son Ferishta, and through his influence the historian was advanced to high honours in the court. When Murtuza was assassinated, Ferishta, who was then only seventeen years of age, was captain of the royal guard.

In the troubles following the death of Murtuza, Ferishta left Ahmednugger, A.D. 1589, and went to Bejapoor, where he was kindly received by the regent and minister, Dilawur Khan, who introduced him to Ibrahim Adil Shah II., the reigning monarch. In this court he spent the remainder of his life in high honour, engaged sometimes in military expeditions, as we learn from his own history, and devoting his leisure time to the composition of his great work. He died, in all probability, soon after A.D. 1611, at the age of 41. He makes mention, in his history, of the English and Portuguese factories at Surat, A.D. 1611.

The preceding account has been chiefly taken from the English translation of Ferishta by Colonel Briggs, which was published in London, 1829, in 4 vols. 8vo.

The history of Ferishta is divided into twelve books, with an introduction, which gives a brief and imperfect account of Hindoo history before the time of the Mohammedans, and also a short account of the conquests of the Arabs in their progress from Arabia to Hindustan. At the conclu-

sion of the work, Ferishta gives a short account of the geography, climate, and other physical circumstances of Hindustan.

Ferishta is certainly one of the most trustworthy of oriental historians. He seems to have taken great pains in consulting authorities. At the close of his preface he gives a list of thirty-five historians to whom he refers; and Colonel Briggs mentions the names of twenty more who are quoted in the course of the work. 'What is really remarkable in this writer,' says Colonel Dow, 'is, that he seems as much divested of religious prejudices as he is of political flattery or fear. He never passes a good action without conferring upon it its due reward of praise, nor a bad one without stigmatizing it with infamy.'

FERMANAGH, a county of Ireland, in the province of Ulster, is bounded N. and N.E. by Tyrone, N.W. by Donegal, S.W. by Leitrim, S. by Cavan, and E. by Monaghan. Its greatest length, N.W. and S.E., is 45 miles; its greatest breadth, N.E. and S.W., is 29 miles. The area is 714 square miles, or 457,195 acres, of which 289,228 are arable, 114,847 uncultivated, 6,155 in plantations, 46,755 under water, and 210 in towns. The population in 1841 was 156,841, of whom 150,795 were in the rural district, and 5686 in the civic district.

Fermanagh is divided into two nearly equal portions by Loch Erne, which lies almost entirely in the county of Fermanagh, and traverses it from one end to the other. The limits extend from Beleek on the N.W. to Belturbet on the S.E., a length of 40 miles. Several large rivers empty themselves into the lake, which are navigable for boats from two or three miles up. On account of the numerous shoals and fords that occur in the narrow parts, the boats employed on the lake are chiefly flat-bottomed and of a very rude construction. Lough Erne is usually considered as divided into two, the Upper Lake and Lower Lake, with a distance of six or seven miles between them, consisting of a narrow channel, which may more properly be called part of the river Erne. The Lower Lake is by far the larger and deeper, having in some places from 200 to 230 feet of water; but the depth is very irregular, and its surface is thickly studded with islands. Although within four miles of the sea, it stands at an elevation of 148 feet above low-water spring-tides in the dry season, and rises from 6 to 8 feet in the winter, according to the season. The first fall occurs at the village of Beleek, from which point to Ballyshannon there is a constant succession of falls. In the Upper Lake the most open part is not above a mile and a half in each direction, and in this space are several small islands. Its depth seldom exceeds 20 feet, the greatest that occurs being 75. Its level ranges from 11 inches to 2 feet 10 inches above the Lower Lake, the mean difference being about 20 inches. The portion of the county which lies south of Loch Erne contains a large tract of waste and mountain, which is bounded on the south by Loch Melvin and Upper and Lower Loch Macnean. It contains seven or eight elevations more than 1000 feet in height; and among them are many small lakes and many limestone caverns, through which the smaller rivers flow. The district north of the Upper Loch Erne is less mountainous, more fertile, more thickly inhabited, and contains a greater number of fine residences of the gentry.

The rivers of Fermanagh are small. From the mountainous district on the south-west the Silees and Arney run into Loch Erne: the Cladagh or Swanlinbar river, flowing south-east of Cuilcagh, has a like termination. The Woodford, and the Drumany or Colebrook, both fall into Loch Erne.

The climate is somewhat cold and moist; violent winds are common in winter, and render the navigation of the lake dangerous. The chief geological formations of the county are limestone, sandstone, grit, and grauwacke.

The soil is mostly cold and moory, but has been brought into a good state of productiveness throughout the arable districts. Timber is generally of a good growth: at Florence Court in particular the timber is very large. The area under culture in 1847 comprised 54,326 acres of corn, 907 of beans, 3681 of potatoes, 3575 of turnips, 28,712 of meadow and clover, 1221 of flax, and 961 of other crops=93,383 acres under crop.

The linen manufacture is carried on to some extent, but does not form any considerable branch of commerce. The fair of Maguire's bridge is much frequented by purchasers of horses and young cattle.

Fermanagh is divided into eight baronies. It is chiefly in the diocese of Clogher, with a small portion in that of Kilmore. The county returns two members to parliament, constituency about 4000; and one member is returned for the borough of Enniskillen. The assizes are held at Enniskillen.

The only town which is sufficiently large to require a notice is Enniskillen.

Enniskillen, a parliamentary borough and the assize town of the county, is situated on an island in the narrow channel which connects the Upper Lake and Lower Lake of Lough Erne, 101 miles N.W. from Dublin by the road. Two bridges connect the island, which is covered to the water's edge with the buildings of the town, with the suburbs on each side. The town and passage of the river are defended by two small forts, one at each end of the town. The town contains a county court-house and a county gaol. It has a handsome parish church, a Roman Catholic chapel, a Presbyterian meeting-house, and a Methodist meeting-house. It has a Linen-Hall, a union workhouse, two barracks, a savings' bank, and three national schools. In the vicinity is the royal school of Portora, founded by Charles I., and liberally endowed. The houses of the town are not of a superior class, but it has a clean and orderly appearance. It has a good retail trade, a considerable corn-market, and a small manufacture of leather. Timber, coals, and other articles are conveyed by barges from Beleek, a small town at the foot of the Lower Lake, to Enniskillen, and a small steamer runs between it and the Ulster Canal, which connects the Upper Lake with Lough Neagh. Enniskillen returns one member to parliament. The entire population in 1841 was 5686.

Fermanagh was first erected into a county by statute of the 11th of Elizabeth; but it was not till the time of the plantation of Ulster that it was finally brought under civil government. Having fallen to the crown by the attainder of Maguire, it was divided among Scottish and English undertakers and native Irish. The subsequent forfeitures of 1641 affected a large portion of Fermanagh, and considerably increased the possessions of those from whom many of the present proprietors are descended.

(*Ordnance-Survey Map of Fermanagh;* Harris's *Hibernica;* Inglis's *Ireland in* 1834; *Parliamentary Papers.*)

FERMAT, PIERRE DE, was born at Toulouse in 1595, and was brought up to the profession of the law. We have but few incidents of his private life, except that he became a counsellor of the parliament of his native town, was universally respected for his talents, and lived to the age of seventy years.

Some of his labours are contained in the edition of Diophantus, published by his son in 1670: the rest, as far as separately printed, in his 'Opera Varia,' published in 1679. There are still unedited letters. Fermat is best known by his celebrated theorem on polygonal numbers. Bachet asserts that Diophantus had given implied proof of his knowing that every number may be composed of four squares at most. Fermat announced the theorem that no number requires more than three triangular numbers, nor more than five pentagonal ones, &c. The whole of the actual works of Fermat fill an exceedingly small space; nevertheless, they contain the germs of analytical principles which have since come to maturity. In fact they may be regarded, generally speaking, as announcements of the results to which he had arrived, without demonstrations, or any indications of the processes employed.

The properties of numbers were the subject of his enthusiastic researches, and no single individual has added more that is both curious and useful to this branch of mathematics than Fermat.

FERMENTATION, the changes which occur in certain vegetable and animal matters, and by which there are produced new fluids and gaseous compounds. Fermentation is of three kinds: the *vinous*, producing alcohol; the *acetous*, yielding vinegar; and the *putrefactive*, of which the products are very variable, and usually fetid.

When the expressed juice of grapes is exposed in warm weather to the air, it soon becomes turbid; its temperature rises a few degrees, a motion occurs in the fluid, and minute bubbles of air form and break. As the process goes on, a thick froth, consisting of these bubbles and viscid matter, rises to the surface, and, when these bubbles have burst, a viscid substance falls to the bottom of the vessel: this possesses the property of causing fermentation to take place in other fluids which, without its presence, would not undergo such a change: this substance is called *yest*. The sugar of the grape has undergone by this fermentation a decomposition into alcohol and carbonic acid.

Although sugar yields alcohol by its decomposition, yet pure sugar suffers no fermentation. In the juice of the grape, there is some accompanying matter which acts as a ferment; and when yest is thus spontaneously produced it causes fermentation in sugar, without, as far as appears, adding anything important. It produces the effect by what has been termed *an action of presence*, by Berzelius denominated *catálysis*.

The fermentation of malt-extract is noticed under DISTILLATION. Acetous fermentation is treated under ACETIC ACID and VINEGAR. The putrefactive fermentation is the spontaneous decomposition of vegetable and animal matter, which is unaccompanied with the production of alcohol or acetic acid. In vegetable putrefactive fermentation the principal product is carbonic acid, and probably water, both derived from the absorption of the oxygen of the air, which unites with the hydrogen and carbon of the vegetable matter. In the putrefactive fermentation of animal matter ammonia is formed by the union of the hydrogen and nitrogen of the substance.

FE'RMO ED AS'COLI, a delegazione or province of the Papal State, east of the Apennines, is bounded E. by the Adriatic, and N.W. by the province of Macerata, W. by that of Spoleto, and S. by the Abruzzi. The province is covered by offsets of the Apennines, which extend to the Adriatic, and inclose numerous valleys watered by rivers or rather torrents, the principal of which are the Chienti, the Aso, the Tesino, and the Tronto. The length of the province along the Adriatic is 30 miles, and its greatest breadth is about the same. The area is about 1070 square miles, and the population 160,000. The chief produce of the country consists in corn and cattle. Wine and oil are also made. The principal towns are—ASCOLI: *Fermo*, a pleasant town and a bishop's see, built on high ground, about 4 miles from the sea, and surrounded by old walls and ditches, with several churches and convents, and 6000 inhabitants, who carry on some trade in corn and wool by means of the small harbour of Porto di Fermo: *Sant' Elpidio*, near the mouth of the Tenna, which has 3000 inhabitants: *Ripastransone*, a walled town, which stands about 5 miles from the coast and near the Tesino, and has 2000 inhabitants: *Grottamare*, a thriving town on the coast, which carries on some trade by sea, has some sugar refineries, and about 4000 inhabitants: *Offida*, on a hill of the Tesino, which has a handsome collegiate church, some manufactories of lace, and about 3000 inhabitants: and *Montalto*, a walled but decayed town, with only 600 inhabitants.

FERMOY. [CORK.]

FERNANDEZ, NAVARRETE, surnamed El Mudo (the dumb), born 1526 at Logroño, on the Ebro, was a pupil of Titian, and painter to Philip II., who employed him at the Escurial. His principal work is 'Abraham with the Three Angels.' On account of his colouring, he was called the Spanish Titian. There are many of his paintings in the Louvre.

FERNANDEZ, JUAN, is the name of a small group of islands in the Pacific, about 400 miles from the western coast of South America. The

group consists of two larger islands, Masatierra and Masafuera, and a few small rocks. Masatierra, which alone is often called Juan Fernandez, is situated in 33° 40′ S. lat., and about 100° W. long. Masafuera, which is more than 2° farther west, in the same latitude, is a heap of immense rocks rising precipitously from the sea to the height of 3000 feet and more, without any convenient landing-place. Masatierra, the larger of the two, is about 18 miles long, but only 6 miles across in its widest part. Towards the northern extremity is Cumberland Bay, which affords safe anchorage for vessels of any size. Goats in a wild state are found here. The Buccaneers of the seventeenth century, finding these islands uninhabited, made them a place of resort during their cruises on the coasts of South America. On one occasion, a Scotchman, named Alexander Selkirk, being left on the island of Masatierra, lived there more than four years; and the knowledge of this fact probably suggested to Defoe the story of 'Robinson Crusoe.'

FERNANDO PO, an island situated on the western coast of Africa, opposite the mouths of the Niger, in the Bight of Benin, 3° 25′ N. lat., 8° 50′ E. long., is about 24 miles long, and 16 broad. Its surface, which is very uneven, rises towards the centre into two summits, each about 2000 feet above the sea. It is covered with wood, and is everywhere well watered and fertile. Yams, palms, and other tropical plants, grow abundantly; and turtles and fish are plentiful. There are several small harbours; the largest is Maidstone Bay, on the northern shore, which is formed by a headland called Point William, rising 150 feet above the sea, on which the English settlement of Clarence Town was established in 1827. This island was discovered in 1741 by the Portuguese, who in 1788 ceded it to Spain. In 1827 the English, with the permission of Spain, took possession of it.

FERNEY. [Ain.]

FERN. [Aspidium.]

FERNS. [Filices.]

FERNS, a bishop's see in the archdiocese of Dublin, in Ireland, is now incorporated with Ossory and Leighlin, thus forming the combined bishopric of Ossory, Ferns, and Leighlin. [Bishopric.] Ferns is a small decayed town in Wexford, with a mean cathedral, also used as a parish church, and a handsome episcopal palace.

FERO'NIA, the name of a genus of plants belonging to the natural order *Aurantiaceæ*. *F. elephantum* is the Elephant or Wood Apple of the Coromandel coast, where it is very generally eaten. The branches of this tree are armed with small spines. The fruit is fleshy, and extremely acid before it arrives at maturity; but, when ripe, it contains a dark brown agreeable subacid pulp. In appearance the fruit is large, spheroidal, rugged, and often warted externally; the seeds are in five parcels, and are flat and woolly, adhering to the branched placentæ by means of long cords. A transparent oily fluid exudes from the trunk of this tree when an incision is made into it, which is used by painters for mixing their colours. A clear white gum may also be obtained from the tree very much resembling gum-arabic. The wood is likewise valuable on account of its durability, whiteness, and hardness. *F. pellucida* has leaves full of transparent dots: it is a native of the East Indies, where the fruit is generally eaten. The flowers are white.

FERRA'RA, LEGAZIONE DI, the most northern province of the Papal State, is bounded N. by Austrian Lombardy, E. by the Adriatic, W. by the duchy of Modena, and S. by Ravenna and Bologna. Its greatest length, E. to W., is about 50 miles, and its greatest breadth 35 miles. The area is about 1100 square miles, and the population about 200,000, distributed among 5 città, or walled towns, 17 terre, or small towns having a communal council, and 153 ville, or villages and hamlets. The soil is naturally rich, but the greatest part is swampy. The chief productions are rice, corn, pulse, hemp, grass, wine, and fish. The principal towns are: 1. Ferrara: 2. Comacchio, with 5400 inhabitants, occupied in fishing in extensive swamps which surround their town. 3. Cento, with 4000 inhabitants. 4. Lugo, with 8800 inhabitants. 5. Bagnacavallo, with 3500. Among the terre the principal are: Argenta, with 4000 inhabitants, including its territory; Bondeno, 7000; Copparo, 7000; Cotignola, 5600; Fusignano, 4700; Mesola, 4000; Pieve di Cento, 3500; Ponte di Lagoscuro, 3600; Porto Maggiore, 6500.

The country is in general very flat, and the air unwholesome. Dykes are necessary to keep the Po from overflowing the low grounds. There are various branches of the Po in Ferrara, which are connected by canals.

FERRA'RA, the capital of the province of the same name, and the residence of the papal legate or political governor, and an archbishop's see, is situated in the midst of a flat country on the north bank of an arm of the Po, in 44° 49′ N. lat., and 11° 41′ E. long. It is a large and well-built town, with streets wide and straight, the principal of which, called San Benedetto, is about 2000 yards in length. Ferrara is inclosed by walls, and in the centre is a castle, flanked with towers and surrounded by wet ditches. The castle is garrisoned by Austrian troops. The town contains numerous churches, most of them rich in paintings by masters of the Bolognese and Ferrara schools. The finest churches are—the Cathedral, built in the 12th century; San Benedetto; San Domenico; Santa Maria del Vado, the oldest church of Ferrara; and the churches San Francesco, i Teatini, il Gesú, &c. Among the palaces of Ferrara, the finest are those of Villa and Bevilacqua. The theatre is one of the largest and finest in Italy. The house of Ariosto, which he purchased himself, is shown to strangers. The University of Ferrara has a valuable library of 80,000 printed volumes and 900 MSS.

Ferrara is one of the most interesting and handsome of the modern towns of Italy, for it has no claims to classical antiquity, having risen after the fall of the empire. It contains about 34,000 inhabitants, of whom more than 2000 are Jews. It has much trade in agricultural produce.

FERRA'RI, GAUDENZIO, a Lombard painter and sculptor of the Milanese school of Lionardo da Vinci. He was born in Valdugia in 1484, was instructed by Luini, and worked under Raphael at Rome. He was correct in design, laborious and careful in his execution, and extremely brilliant in his colouring; but his works are quite void of tone, though his figures are well rounded, and he can have had no knowledge of or feeling for harmony of colour. His principal works are in Milan, and are exclusively illustrative of the origin or mysteries of Christianity. He died in Milan in 1550.

FERREI and FERRARI, the names of two Italian mathematicians, who were nearly contemporary with each other. Scipio Ferrei was a native of Bologna, and taught mathematics there from 1496 to 1526. He is said to have been the first who possessed a method of solving any case of cubic equations.

Ludovico Ferrari was also born at Bologna, and was the pupil of Cardan. At the instigation of the latter he turned his attention to biquadratic equations, and produced the method known by his name.

FERREIRA, ANTONIO, the reformer of the national poetry of Portugal, and surnamed the Portuguese Horace, was born at Lisbon, 1528. While studying law at Coimbra, he devoted his time more particularly to literature. Growing tired of a university life, he went to court, where he obtained a dignified situation, and, while entertaining still higher expectations, he was carried off in the prime of life by the plague in 1569.

Although not a first-rate poet in imagination and originality, Ferreira possessed taste, correctness, and deep thought. His sonnets, without displaying any affected imitation of Petrarca's, remind us of the Italian poet and his Laura. His epistles, written evidently when he was in his maturity, are the first productions of the kind in the Portuguese literature. His tragedy of 'Ines de Castro' abounds with beautiful passages, but is deficient in true pathos, and displays a forced imitation of the Greek manner and style. His 'Poemas Lusitanos' appeared first at Lisbon in 1598, 4to. All his works were printed under the title 'Todas as Obras de Ferreira,' Lisbon, 1771, 2 vols. 8vo., which edition contains Ferreira's biography.

FERRE'RAS, DOCTOR DON JUAN, born at Labañeza, in the diocese of Astorga, a most minute and accurate historian. Having gone through a complete course of classical and theological learning, Ferreras displayed his eloquence in the pulpit. He was a very useful member of the academy of the Lengua Española, founded in 1713, especially in the compilation of its dictionary, in 6 vols. folio, published in 1726–1739, to which he contributed the articles in the letter G, besides a preliminary discourse on the Castilian tongue. At his death, 1735, in addition to his other appointments, he held that of librarian to Philip V. Ferreras wrote in all thirty-eight works, some of which remain unpublished; the most important is the 'Synopsis Historica y Chronologica de España,' Madrid, 1700 1727, 16 vols. 4to. It extends to the close of Philip II.'s reign in 1588. Hermilli translated it into French, with valuable notes, in 10 vols. 4to., Paris, 1742.

FERRET. [WEASELS.]

FERRI, CIRO, a Roman fresco painter, born in 1634. He was the most distinguished scholar of Pietro da Cortona, and greatly assisted that painter in his extensive works in fresco, both in Rome, and in the Palazzo Pitti at Florence. Ferri's works are of the same character as Pietro da Cortona's; many of them have been engraved. He died at Rome in 1689.

FERRO, or HIERO. [CANARIES.]

FERROCYANIC ACID is composed of (when dry and not crystallized)—

Hydrocyanic acid	46.57
Cyanide of iron	45.77
Water	7.66
	100.

It contains 23.27 per cent. of iron.

This acid is decomposed by long exposure to the air, Prussian blue being formed and precipitated; this is also produced by adding it to a per-salt of iron.

FERRO'L, a seaport town of Gallicia in Spain, on an arm of the Bay of Betanzos, stands about 15 miles, by water, N.E. from Coruña, and has 13,000 inhabitants. The harbour is large and safe, and its entrance is defended by strong batteries. There are extensive docks for the Spanish navy. The town is regularly built, the streets crossing each other at right angles. It has a school of navigation, some manufactures of hats, and carries on a considerable fishery of herrings and sardines, which are pickled and exported.

Ferrol carries on some trade with America, exporting wine, brandy, and corn. It is the residence of a commandant-general, and other chief officers of the naval department.

(Minaño, *Supplemento al Diccionario Geografico de España.*)

FERRY, an exclusive privilege by prescription or the king's grant for the carriage of horses and men across a river or arm of the sea for reasonable toll. The owner of a ferry cannot suppress it and put up a bridge in its stead without a licence; but he is bound to keep it always in repair and readiness, with expert men, and reasonable toll, for neglect of which he is liable to be punished by indictment. If a ferry is erected so near to an ancient ferry as to draw away its custom, it is a nuisance to the owner of the old one, for which the law will give him remedy by action. A ferry is considered as a common highway. (3 Blackstone, *Com.*; 13 Viner, *Abr.* 208.)

FERTÉ-MACÉ. [ORNE.]

FERTÉ-SOUS-JOUARRE. [SEINE-ET-MARNE.]

FE'RULA, a genus of umbelliferous plants, whose species often yield a powerful stimulating gum-resin employed in medicine. The drugs called Sagapenum and Assafœtida are produced by species of this genus, but by which in particular is not known with certainty; and it appears probable that, in fact, several different species yield those substances.

Assafœtida is said to be found only in two dis-

BRANCH LIBRARY
Accession No. 7223
UDC No.
Date:

tricts of Persia, that is, the fields and mountains round Herat, the capital of Khorassan, and the range of mountains in the province of Lar. The *F. assa-fœtida* is said to arrive at as great an age as man himself, and in consequence its roots sometimes attain a considerable size. It is from wounds in this part that the drug is obtained. The roots are not wounded before they are four years old; the greater their age, the better the quality of their produce. There were four operations each year when Kæmpfer visited the country; the first in the middle of April, the second at the latter end of May, the third ten days later, and the fourth in the beginning of July. The gatherers on the first occasion only cleared the hard sandy or stony soil away from the root to the depth of a span or so, pulling off the leaves, replacing the earth about the roots, and then heaping the leaves on them, and pressing them down with a stone. On the subsequent occasions they slice the roots transversely, beginning a little below the top, and collecting the juice that flows from the wounds. After every operation they cover the root with the old leaves, to screen it from the sun. After the last gathering the roots are left to perish.

Ferula Persica, a perennial species, has been reported to yield assafœtida. Treviranus found it yielding a substance extremely like assafœtida, in the botanic garden of Breslau; and the same thing has often occurred in the Apothecaries' Garden at Chelsea. *Ferula orientalis* has been quoted as the source of gum ammoniacum; and it appears that such a substance is really produced, either by that plant or a nearly allied species, in Marocco. *Ferula ferulago* has been taken for the plant which furnishes galbanum; but Professor a Don states that this drug is really yielded by quite different genus, called by him *Galbanum officinale.*

FERUSSI'NA, a genus established by M. Grateloup for a fossil turbinated shell from Dax, which seems at first view very near the *Anostomata*, but which M. Grateloup thinks, from the examination of its aperture, approximates more to the *Cyclostomata*, an opinion in which M. Rang concurs, adding that the species, three or four, are all fossil. It is the same shell, he states, as that afterwards described in the first number (livraison) of the Bulletin of the Linnean Society of Bordeaux, under the name of *Strophostoma* by M. Deshayes.

Generic Character.—Animal unknown. Shell oval, globulous; aperture round, bordered, oblique, simple, toothless, 'retournée du côté de la spire;' umbilicus more or less large.

FESCENNINE VERSES were rude licentious verses sung by young men at weddings, and before the door of the nuptial chamber. This was a very ancient custom in Italy: the practice, and some of the verses themselves, are said to have been introduced from Fescennium, an old Etruscan town near the present site of Cività Castellana. Horace ('Epist.' ii. 1) says that Fescennine verses were sung by the country people at harvest time; and the custom of dealing out licentious jokes upon each other, and upon strangers passing by, is still retained by the vintagers in various parts of Italy.

FESTU'CA, a genus of grasses containing several species of agricultural importance. *F. pratensis*, or Meadow Fescue, is about three feet high, a native of moist meadows, and forms a portion of most good meadow herbage. Mr. Sinclair states that, in point of early produce, this grass ranks next to meadow Fox-Tail, and is much more productive. *F. ovina*, *rubro*, and *duriuscula*, are other agricultural grasses, much smaller than the last, and contributing greatly to the value of pastures. *F. ovina* has a fine succulent foliage, and, according to Linnæus, sheep have no relish for hills on which it does not abound; it is, however, unproductive. *F. rubra* is more abundant in its produce, but less nutritive, and its creeping root-like stems are said to impoverish the soil very much. *F. duriuscula* is preferable to both the preceding; it withstands dry weather better than most grasses, and in combination with *Festuca pratensis* and *Poa trivialis* forms excellent pasturage. It is most prevalent on light rich soils. *F. dumetorum*, another species, will thrive in dry sandy situations, to which property its value is chiefly owing; but its nutritive qualities are slight, and it is altogether an inferior species.

FESTUS, SEXTUS POMPE'IUS, a Latin grammarian, whose age is not clearly ascertained. He compiled an epitome of the voluminous work 'De Verborum Significatione' of Marcus Verrius Flaccus, a grammarian of the Augustan age, mentioned by Suetonius. The work of Verrius is lost, and that of Festus was afterwards abridged in the ninth century by Paulus Diáconus. The best edition of Festus is by K. O. Müller, Leipzig, 4to., 1839.

FETI, DOME'NICO, called *Il Mantuano*, was born at Rome in 1589. He was the scholar of Cigoli, and was court painter to Ferdinando Gonzaga, duke of Mantua, whence his name of Mantuano. He died at Venice in 1624.

Feti executed several works at Mantua. His masterpiece is the 'Feeding of the Five Thousand,' in the Academy of Mantua.

FEUDAL SYSTEM. The essential constituent of the estate called a feud or fief was, that it was not an estate of absolute ownership. The person to whom it was granted did not become owner, but only tenant or holder. There is no proof that fiefs were originally resumable at pleasure, though it is often asserted. They were granted on the condition of certain services, the neglect of which would cause a forfeiture to the grantor or his heirs. It may be that originally the grant was always determined by the death of the grantee, who had only a life estate, and that the grant was then made anew.

The etymology of the word feud, feof, fief, fee, has been much discussed. The opinion that it may be derived from the word Emphyteusis is at least as probable as any other. [EMPHYTEUSIS.]

The origin of the system of feuds has been a fertile subject of speculation. If we merely seek for the existence of a kind of landed tenure resembling that of the fief in its essential principle, it is probable that such may be discovered in various ages and parts of the world. But feuds

alone are not the feudal system. They are only one of the elements out of which that system grew. In its entireness, it is certain that the feudal system never subsisted anywhere before it arose in the middle ages in those parts of Europe in which the Germanic nations settled themselves after the subversion of the Roman empire.

The system of feudalism comprised the notion of a tenant who owed services for his land, and that of vassal, which denoted a personal relation to the lord. It appears to be certain that the original vassali or vassi were merely noblemen who attached themselves to the court and to attendance upon the prince, without necessarily holding any landed estate or beneficium by royal grant. Vassal has been derived from the Celtic *gwas*, and from the German *gesell*, which are probably the same word, and of both of which the original signification seems to be a helper, or subordinate associate, in labour of any kind.

If the vassal was at first merely the associate of or attendant upon his lord, nothing could be more natural than that, when the lord came to have land to give away, he should most frequently bestow it upon his vassals, both as a reward for their past and a bond by which he might secure their future services. The vassal was conveniently and appropriately rewarded by a fief, that is, by a loan of land, the profits of which were left to him as entirely as if he had obtained the ownership of the land, but his precarious tenure of which, at the same time, kept him bound to his lord in the same dependence as before.

When fiefs for life became established, the next step would be for the eldest son usually to succeed his father. His right so to succeed would next be established by usage. At a later stage fiefs became descendible in the collateral as well as in the direct line. At a still later, they became inheritable to females as well as to males. There is much difference of opinion, however, as to the dates at which these several changes took place. Some writers conceive that fiefs first became hereditary in France under Charlemagne; others, however, maintain that there were hereditary fiefs under the first race of French kings.

Throughout the whole of this progressive development of the system, however, if we admit such a progressive development to have existed, the original nature of the fief was never forgotten. The ultimate property was still held to be in the lord; and that fact was very distinctly signified, not only by the expressive language of forms and symbols, but by the duties of the tenant. Even after fiefs became descendible to heirs in the most comprehensive sense, and by the most fixed rule, every new occupant of the estate had still to make solemn acknowledgment of his vassalage, and thus to obtain, as it were, a renewal of the grant from the lord. He became bound to discharge all services and other dues as fully as the first grantee had been. In certain circumstances, as, for example, if the tenant committed treason or felony, or if he left no heir, the estate would still return by forfeiture or escheat to the lord, as to its original owner.

Originally fiefs were granted only by sovereign

princes; but in course of time tenants began to exercise the power of lords, by the practice of what was called sub-infeudation, that is, the alienation of portions of their fiefs to other parties, who were placed in the same or a similar relation to them as that in which they stood to the prince. The vassal of the prince became the lord over other vassals; in this latter capacity he was called a mesne (that is, an intermediate) lord; he was a lord and a vassal at the same time. In the same manner the vassal of a mesne lord might become also the lord of other arrere vassals, as those vassals that held of a mesne lord were designated.

In all the continental provinces of the Roman empire which were conquered and occupied by the Germanic nations, many lands were from the first held, not as fiefs, but as allodia, in full and entire ownership. [Allodium.] The holder of such an estate, having no lord, was of course free from all the duties which were incidental to the vassalage of the holder of a fief. He was also, however, without the powerful protection which the latter enjoyed; and so important was this protection in the turbulent state of society which existed in Europe for some ages after the dissolution of the empire of Charlemagne, that in fact most of the allodialists in course of time exchanged their originally independent condition for the security and subjection of that of the feudatory.

After the conquest of England by the Normans, the *dominium directum*, or property of all the land in the kingdom, was considered as vested in the crown. 'All the lands and tenements in England in the hands of subjects,' says Coke, 'are holden mediately or immediately of the king; for in the law of England we have not properly allodium.' This universality of its application therefore may be regarded as the first respect in which the system of feudalism established in England differed from that established in France and other continental countries. There were also various other differences. The Conqueror, for instance, introduced here the practice, unknown on the continent, of compelling the arrere vassals, as well as the immediate tenants of the crown, to take the oath of fealty to himself. In other countries a vassal only swore fealty to his immediate lord: in England, if he held of a mesne lord, he took two oaths, one to his lord and another to his lord's lord. The wardship or guardianship of the tenant during minority, which implied both the custody of his person and the appropriation of the profits of the estate, appears to have been enjoyed by the lord in some parts of Germany, but nowhere else except in England and Normandy. The right of marriage (maritagium) originally implied only the power possessed by the lord of tendering a husband to his female ward while under age: if she rejected the match, she forfeited the value of the marriage; that is, as much as any one would give to the lord for permission to marry her. But the right was afterwards extended so as to include male as well as female heirs. The seignorial prerogative of marriage, like that of wardship, was peculiar to England, Normandy, and some parts of Germany.

Military service, or knight-service as it was called in England, though it was the usual, was by no means the necessary or uniform condition on which fiefs were granted. Any other honourable condition might be imposed which distinctly recognized the *dominium directum* of the lord. [KNIGHT'S-SERVICE.]

The grant of land as a fief, especially when it was a grant from the suzerain, or supreme lord, whether called king or duke, or any other name, was sometimes accompanied with an express grant of jurisdiction. Thus every great tenant exercised a jurisdiction civil and criminal over his immediate tenants: he held courts, and administered the laws within his lordship like a sovereign prince. It appears that the same jurisdiction was often granted by the crown to the abbeys with their lands. The formation of manors in this country appears to have been consequent upon the establishment of feudalism. [MANOR.] The existence of manor-courts, and so many small jurisdictions within the kingdom, is one of the most permanent features of that polity which the Normans stamped upon this country.

In the infancy of the feudal system it is probable that the vassal was considered bound to attend his lord in war for any length of time during which his services might be required. Afterwards, when the situation of the vassal became more independent, the amount of this kind of service was fixed either by law or by usage. In England the whole country was divided into about 60,000 knights' fees; and the tenant of each of these appears to have been obliged to keep the field at his own expense for forty days on every occasion on which his lord chose to call upon him. For smaller quantities of land proportionately shorter terms of service were due: at least such is the common statement. Women were obliged to send their substitutes; and so were the clergy, certain persons holding public offices, and men past the age of sixty, all of whom were exempted from personal service. The rule or custom however, both as to the duration of the service and its extent in other respects, varied greatly in different ages and countries.

There were however various other substantial advantages derived by the lord. We have already mentioned the rights of wardship and of marriage, which were nearly peculiar to the dominions of the English crown. Besides these, there were: the payment, called a relief, made by every new entrant upon the possession of the fief, the escheat of the land to the lord when the tenant left no heir, and its forfeiture to him when the tenant was found guilty either of a breach of his oath of fealty, or of felony. There was besides a fine payable to the lord upon the alienation by the tenant of any part of the estate, if that was at all permitted. Finally, there were the various aids, as they were called, payable by the tenant. [AIDS.]

The principal ceremonies used in conferring a fief were homage, fealty, and investiture. The two first of these cannot be more distinctly or more shortly described than in the words of Littleton. [HOMAGE; FEALTY.] The investiture or the conveyance of feudal land is represented by the modern FEOFFMENT.

The feudal system may be regarded as having nearly reached its maturity and full development when the Norman conquest of England took place. It appears accordingly to have been established here immediately or very soon after that event in as comprehensive a form as it ever attained in any other country. The whole land of the kingdom, as we have already mentioned, was, without any exception, either in the hands of the crown, or held in fief by the vassals of the crown, or of them by subinfeudation. Those lands which the king kept were called his demesne (the Terræ Regis of the Domesday Survey), and thus the crown had a number of immediate tenants, like any other lord, in the various lands reserved in nearly every part of the kingdom. Nowhere else, also, before the restrictions established by the charters, were the rights of the lord over the vassal stretched in practice nearer to their extreme theoretical limits. On the other hand, the vassal had arrived at what we may call his ultimate position in the natural progress of the system; the hereditary quality of feuds was fully established; his ancient absolute dependence and subjection had passed away; under whatever disadvantage his inferiority of station might place him, he met his lord on the common ground of their mutual rights and obligations; there might be considerable contention about what these rights and obligations on either side were, but it was admitted that on both sides they had the same character of real legally binding obligations and legally maintainable rights.

Feudalism, in its strict form, was a thing which could not permanently exist; and it was modified by the irresistible power of new circumstances. For instance, the feudal military army was at length found so inconvenient a force, that soon after the accession of Henry II. the personal service of vassals was dispensed with, and a pecuniary payment, under the name of Escuage, accepted in its stead. The acquisition by the crown of an army of subservient mercenaries, in exchange for its former inefficient and withal turbulent and unmanageable army of vassals, was in fact the discovery of a substitute for the main purpose of the feudal polity.

The effect of sub-infeudation was to deprive the lord of his forfeitures and escheats and the other advantages of his seigniory, and various attempts were made to check or prevent it. It is expressly forbidden by the statute of Quia Emptores (the 18 Ed. I. c. 1). Sub-infeudation was originally the only way in which the holder of a fief could alienate any part of his estate without the consent of his lord; and, as a compensation for the prohibition of sub-infeudation, the old prohibition against alienation was removed; lands were allowed to be alienated, but the purchaser or grantee did not hold them of the vendor or grantor, but held them exactly as the grantor did; and such is still the legal effect in England when a man parts with his entire interest in his lands. This change was effected by the statute of Quia Emptores with regard to all persons except the immediate tenants of the crown, who were permitted

to alienate on paying a fine to the king by the Statute 1 Ed. III. c. 12. Thus, at the same time that a practice strictly accordant to the spirit of feudalism and eminently favourable to its conservation and extension, was stopped, another practice, altogether adverse to its fundamental principles, was introduced and established, that of allowing voluntary alienation by persons during their lifetime.

It was a consequence of feudal principles, that a man's lands could not be subjected to the claims of his creditors; and even now, after a lapse of near 600 years since the Statute of Acton Burnel, the lands of a debtor are not yet completely subjected to the just demands of his creditors. [Acton Burnel; Elegit.] By the several modern statutes of bankruptcy, the whole of a bankrupt debtor's lands have been made saleable for the payment of his debts. Further, by a recent act (3 & 4 Wm. IV. c. 104), all a deceased person's estate in land, of whatever kind, not charged by his will with the payment of his debts, whether he was a trader within the bankrupt laws or not, constitutes assets, to be administered in equity, for the payment of his debts, both those on specialty and those on simple contract.

An attempt was made to restore in part the old restraints upon voluntary alienation by the Statute 13 Ed. I. c. 1, entitled 'De Donis Conditionalibus,' which had for its object to enable any owner of an estate, by his own disposition, to secure its descent in a particular line. The effect was to create what were called estates tail. The power which was thus conferred upon landholders of preventing the alienation of their lands remained in full force for nearly two centuries, till at last, in the reign of Edward IV., by the decision of the courts (A.D. 1472) the practice of barring estates tail by a common recovery was completely established.

The effect of the practice of uses is most appropriately considered under that head. [Use.] The restraint on the disposition of lands by will was removed in the reign of Henry VIII. (Stat. 32 & 34 Hen. VIII.), and all persons were allowed to dispose of their freehold lands held in fee-simple by a will in writing, subject to certain restrictions as to lands held by knight-service either of the king or any other, which restrictions were removed by the Stat. 12 Chas. II. c. 24, which abolished military tenures.

The fabric of the feudal system in England however was shattered by the storm of the great rebellion. The Court of Wards was in effect discontinued from 1645. The restoration of the king could not restore what had thus been in practice swept away. By the Statute 12 Car. II. c. 24, it was accordingly enacted that from the year 1645 the Court of Wards and Liveries, and all wardships, liveries, primer-seisins, values, and forfeitures of marriage, &c., by reason of any tenure of the king's majesty, or of any other by knights' tenures, should be taken away and discharged, together with all fines for alienations, tenure by homage, escuage, aids pur filz marrier and pur fair fitz chevalier, &c.; and all tenures of any honours, manors, lands, tenements or hereditaments, or any estate of inheritance at the common law, held either of the king or of any other person or persons, bodies politic or corporate, were turned into free and common soccage, to all intents and purposes. [Soccage.] It was not till after the lapse of nearly another century that the tenures and other institutions of feudalism were put an end to in Scotland by the statutes, passed after the rebellion, of the 20 Geo. II. c. 43, entitled 'An Act for abolishing Heritable Jurisdictions;' and the 20 Geo. II. c. 50, entitled 'An Act for taking away the Tenure of Ward-holding in Scotland, for giving to heirs and successors a summary process against superiors, and for ascertaining the services of all tenants,' &c. Nor have estates tail in Scotland yet been relieved from the strictest fetters of a destination in perpetuity, either by the invention of common recoveries, or by levying a fine, or by any legislative enactment.

We have enumerated the principal statutes which may be considered as having broken in upon the integrity of the feudal system, considered in reference to the power which the tenant of land can now exercise over it, and the rights which others can enforce against him in respect of his property in it. But the system of tenures still exists. The statute of Charles II. only abolished military tenures and such parts of the feudal system as had become generally intolerable; but all lands in the kingdom are still held either by soccage tenure, into which military tenures were changed, or else by the respective tenures of frankalmoigne, grand serjeanty, and copyhold, which were not affected by the statute.

Some of the consequences of tenures, as they at present subsist, cannot be better exemplified than by the rules as to the forfeiture and escheat of lands, both of which however have undergone modifications since the statute of Charles II.

To attain a comprehensive and exact view of the present tenures of landed property in England and their incidents and consequences, it would be necessary for the reader to enter upon a course of study more laborious and extensive than is consistent with pursuits not strictly legal. Still a general notion may be acquired of their leading characteristics by referring to articles already quoted, and to such heads as Attainder, Baron, Copyhold, Courts, Distress, Escheat, Estate, Forfeiture, Lease, Manor, Tenures, &c.

FEUERBACH, PAUL JOHANN ANSELM, was born at Frankfort-on-the-Main, May 14th, 1775. After having studied at Jena, he gave lectures there on law in 1798, and became successively professor at the universities of Giesen, Jena, Kiel, and Landshut. While he was a lecturer at Jena he published his 'Anti-Hobbes, or on the Limits of Civil Power, and on the compulsory Right of Subjects against their Sovereigns;' and a number of essays inserted in the 'Magazine of Criminal Jurisprudence.' But the work which established his fame was his 'Review of the Fundamental Principles and Fundamental Ideas of Penal Law,' which appeared shortly afterwards. His 'Critique of the Project of a Penal Law for Bavaria,' published in 1804, is another remarkable work. These purely theoretical essays exercised a very considerable influence on the

criminal legislation of Germany, and were followed by practical effects. Almost immediately on the publication of the last-mentioned work, and while he was professor at Landshut, the Bavarian government intrusted him with drawing up a project of a criminal code for the kingdom, which, after having been submitted to a commission, was adopted with very few modifications. The leading idea of his work entitled 'Considerations on the Jury' consists in the proposition that the verdict of the jury is insufficient to establish the fact of crime. After having been assailed by a number of eminent writers, and in particular by Grolman, Feuerbach modified his opinions on the jury in 1821, during a visit to France, Belgium, and the Rhenish provinces, on a mission from the Bavarian government to investigate the legal institutions of those countries. On his return he published the result of his inquiries in his 'Reflections on the Judicial Organization and Proceedings in France,' a work remarkable for the sagacity with which he lays open the deficiencies of the French civil and penal legislation.

Feuerbach's opinion on the jury had a very unfavourable influence on the Bavarian government when the introduction of that institution came under consideration, and ultimately it was the cause of the jury not being granted. In 1817 he was made second president of the court of appeal at Bamberg, and in 1821 he was nominated first president of the court of appeal at Anspach. To those functions his sphere of action was latterly entirely confined, with the exception of opinions given in important civil and criminal cases. One of those was the notorious affair of Kaspar Hauser, which produced so much sensation all through Europe. A rumour prevails that his sudden death at Frankfort in May 1833, is not unconnected with that mysterious affair. His connection with the Bavarian government became in latter years very disagreeable in consequence of his decided opposition to its illiberal policy. Feuerbach was a man of polite acquirements as well as of professional eminence. The correctness and elegance of his language have powerfully contributed to improve the style of recent German writers on law. In this respect his 'Exposition of remarkable Criminal Cases, founded upon Documents,' merits particular mention. Previously to Feuerbach's time all similar essays were heavy and uninteresting, in consequence of all the documents being accumulated in their original uncouth form, without order or regard to the really interesting features of the case, namely the development of psychological considerations. This work, which is written with true poetical talent, is a remarkable specimen of investigation into the human heart, rendered still more striking by the most delicate and humane estimation of actions; it may be considered at once a model of exhaustive inquiry and a book of morals. In bold and vivid language he has promulgated the doctrine that it is impossible perfectly to harmonize the inflexible universality of law with individual culpability, and that it therefore is an unavoidable necessity, in particular cases, to modify and soften the sentence of the law by the power of pardon.

FEUIL'LEA, a genus of plants belonging to the natural order *Cucurbitaceæ*. *F. trilobata* is a native of Brazil. It is the *Feuillea scandens* of some authors, and the celebrated Ghandirhoba of South America, where it is held in great repute as an antidote to various poisons, animal and vegetable. The natives employ it, not only against serpent-bites, but also to counteract the baneful effects of the Manihot and Manchineel. *F. cordifolia* is a native of the West Indies, and has likewise a reputation as a preventive of the ill effects of vegetable poisons. *F. Javilla* is a native of New Granada, in the woods near Turbaco. The fruit of the Feuillea is as large as an apple, and from a fancied resemblance it is called the Shaving-Box.

FEURS. [LOIRE.]

FEVER. Febrile diseases are divided into three great classes, according to the persistence or non-persistence of the morbid phenomena. Of these classes the first includes the Fevers called Intermittent [AGUE], in which the morbid phenomena, after having continued a certain time, disappear, but after an interval of a certain duration again recur, this alternate recurrence and remission taking place many times. In the second class the febrile phenomena do not wholly disappear, but merely diminish in violence; do not intermit, but remit: these constitute Remittent Fevers. In the third class there is neither any intermission nor remission of the febrile state, but a constant and uninterrupted progression of the disease to a certain termination; fevers in which the phenomena are thus uninterruptedly continuous constitute the class of *Continued Fevers*.

Since the concurrence and succession of phenomena which constitute a paroxysm of intermittent fever, or an attack of ague, afford a paradigm, or example, of the febrile state in general, of course the individual phenomena which take place in an attack of continued fever must be essentially the same as those described under AGUE. There are however some modifications which require attention.

The first event to be noticed in the continued fevers is the derangement of the functions of the nervous system. There is reason to believe that this derangement takes place primarily in the organic system of nerves, that system which presides over the nutrition of the organs, and consequently that the very first effect of the noxious agent, whatever it be, which produces fever, is to disorder the health of the organs, and thereby to impair their energy.

Though it is probable that a disorder of the organic nerves is the first event that actually takes place in fevers, yet the first event of which we become conscious would seem to be a derangement in the second portion of the nervous system, the great nervous centres in which sensation, intellectual operation, and voluntary motion have their seat, namely, the brain and spinal cord. The organic functions being carried on without consciousness, we can know that they are disordered only by their producing disturbance in some part of the sentient system. The organic portion of the nervous system is most intimately connected with the sentient portion, and any disorder of the former

is quickly extended to the latter. In an attack of fever the disordered condition of the brain is indicated by a loss of mental energy, and closely connected with this mental weakness is the loss of energy in the muscles of voluntary motion. Lassitude is the result. The movements of the body are feeble and unsteady, as the energy of the mind is impaired.

From this morbid condition of the brain and of the muscles of voluntary motion, there results an uneasy sensation, which has been appropriately and expressively named Febrile Uneasiness. To this there is soon superadded positive pain, which is first felt in the back and loins, and in the limbs.

A remarkable change is commonly visible in the countenance. Its expression is that of dejection; it is often strikingly similar to that of a very weak person suffering from fatigue. The colour of the face is pallid, and the features are somewhat shrunk; but its general aspect is so peculiar and characteristic, that an experienced eye can distinguish the disease, even at this early period, and without asking a single question. The skin partakes in a remarkable degree of the debility which so early shows itself in the muscles of locomotion. Ordinary degrees of temperature produce a sensation of cold which is sometimes intolerable; chilliness is felt, even in a heated room, or in a warm bed: hence the sensation of cold, sometimes increasing to shivering, which has been considered one of the most constant signs of fever.

While the patient experiences the sensation of cold, there is no diminution of the quantity of caloric in the system. The thermometer applied to any part of the body commonly rises as high as in the state of health; and the skin, touched by the hand of another person, communicates not the feeling of cold, but often, on the contrary, that of preternatural heat. In this form of fever the chilliness in many cases never amounts to shivering; in others there is an attack of well-marked rigor, and in others, again, there is either no feeling of cold, or it is so slight that it escapes observation.

The pulse is no longer perfectly natural; it is more languid than in the state of health; sometimes it is also quicker; at other times it is slower; now and then it is scarcely changed in frequency, but its action is invariably weaker than in its sound state.

The respiration is shorter and quicker than natural; the chest does not expand so freely, and compensation seems to be sought in an additional number of respirations. Oftentimes neither the pulse nor the respiration appears to be much altered, if the patient remain perfectly still; but if he rise and walk across the room the pulse instantly becomes rapid, and the respiration is quickened almost to fainting.

It has been stated that the circulation languishes with the diminished energy in the sensorial faculties, and the loss of power in the muscles of locomotion. After awhile the pulse, which was feebler than natural, becomes more full, more strong, and generally more quick than in a sound state; and now the skin, which was cold, becomes preternaturally hot. The heat is at first not uniform over the entire surface of the body: it often happens that some parts are cold while others are burning hot. The heat is oftentimes particularly intense over the forehead or over the back part of the head, or over the whole scalp, while the cheeks are commonly flushed. All these symptoms denote a morbid condition in the action of the heart and arteries.

Immediately the circulation is thus excited, the functions of secretion and excretion become deranged. The mouth is now dry and parched; the tongue begins to be covered with fur; thirst comes on; the secretion of the liver, probably also of the pancreas, and certainly of the mucous membrane lining the whole alimentary canal, is vitiated, as is proved by the unnatural quantity, colour, and fetor of the evacuations; the urine likewise is altered in appearance, and the skin is remarkable for the dryness and harshness which it communicates to the touch.

As soon as the preternatural heat comes on, pain begins to be felt in the head. The pain of the head is often slight at first, and occasionally it remains slight throughout the disease: at other times it is pretty severe. Cases sometimes occur, in which, instead of pain there is only a sense of giddiness, and now and then the uneasy feeling is described as that of lightness, or, on the contrary, as that of heaviness or weight. But, whether the feeling be pain, and that pain be slight or severe, or whether it be giddiness, or lightness, or heaviness, it indicates a similar condition of the organ, and requires a similar treatment. With the accession of pain of the head there is a manifest increase in the disturbance of the sensorial functions.

From the earliest attack of the disease the sleep is disturbed and unrefreshing; now scarcely any is obtained; the febrile uneasiness will not allow of repose; the patient cannot remain in any position long, incessantly shifting his place, never eluding his pain. The pulse also continues to increase in frequency.

The thin white fur which already had begun to appear on the tongue progressively increases in extent and thickness. The colour of the fur usually changes, as the disease advances, from a dirty white to an ash colour; but in this form of the disease the tongue always remains moist, and never becomes brown. This state of the tongue is almost always accompanied with thirst, but it is never urgent. There is always a loss of appetite. The bowels are generally constipated, and the secretions of the whole alimentary canal are vitiated.

In the great majority of patients in whom the symptoms continue thus moderate, the disease disappears about the end of the second week, that is, they are convalescent at that period; but it usually requires eight or ten days longer before they have regained sufficient strength to leave the sick-chamber. Sometimes, although there is no greater severity in the symptoms, the disease is more protracted, and the recovery is not complete until the fourth or even the fifth week. Beyond this period it is very rare for this form of the disease to be protracted.

The experience of the London Fever Hospital

for the ten years preceding 1834, an observation including nearly 6000 patients affected with fever, having been submitted to Mr. Finlaison, he found, among other curious and instructive results, that the mortality of fever resolves itself into the following remarkable progression. Thus, suppose 100,000 patients to be attacked with this disease between the ages of 5 and 16, of these there would die 8266; and of an equal number between—

15 and 26 .	there would die	11,494
25 and 36		17,071
35 and 46		21,960
45 and 56		30,493
55 and 66		40,708
65 and upwards		44,643

By far the most potent febrile poison in continued fever is derived from an animal origin, formed by exhalations given off from the living bodies of those who are affected with fever, especially when such exhalations are pent up in a close and confined apartment. The room of a fever patient, in a small and heated apartment in London, with no circulation of fresh air, is perfectly analogous to a stagnant pool in Ethiopia full of the bodies of dead locusts. The poison generated in both cases is the same, the difference is merely in the degree of its potency. Nature with her burning sun, her stilled and pent-up wind, her stagnant and teeming marsh, manufactures plague on a large and fearful scale. Poverty in her hut, covered with her rags, surrounded with her filth, striving with all her might to keep out the pure air and to increase the heat, imitates nature but too successfully; the process and the product are the same; the only difference is in the magnitude of the result. Penury and ignorance can thus at any time, and in any place, create a mortal plague: and of this no one has ever doubted. Of the power of the living body, even when in sound health, much more when in disease, and above all when that disease is fever, to produce a poison capable of generating fever, no one disputes, and the fact has never been called in question.

It is however consolatory to know that those causes of fever are all removeable; and, whatever amount of disgrace attaches to the existence of a state of things which is known to produce so much misery, it should be remembered that each individual may do much in his sphere to expedite the application of those sanatory measures which can alone effectually repress this terrible disease.

FEZ. [Marocco.]

FEZZAN, a country in Northern Africa, between 24° and 31° N. lat. and 12° and 18° E. long., may be considered as the greatest oasis of the Sahara, by which it is inclosed on the west and east, and partly also on the south. On the north it borders on a less desert region, which belongs to the regency of Tripoli. Its northern part is traversed by two ridges of stony and sandy hills; south of which are sandy plains and a few cultivable valleys between low hills. As there are no rivers or brooks, and only very few natural springs, the irrigation is effected by wells, water being commonly found at a depth of about 100 feet. The heat in summer is very great. The chief products are dates, wheat, barley, and doura. Goats, asses, cows, sheep, horses, and camels are met with.

The principal town, Mourzuck, is surrounded by a wall, and contains about 2500 inhabitants. Towards the northern boundary is Sockna, with about 2000 inhabitants. Zuila, east of Mourzuck, is not so large. The whole of the inhabitants number about 75,000; they are Mohammedans, and are governed by a chief, who is in some degree dependent on the bey of Tripoli.

Fezzan is of some importance in a commercial point of view, being the most frequented road by which Soodan communicates with the countries along the Mediterranean. The industry of the inhabitants is limited to the manufacturing of coarse blankets, which form the principal dress of the lower classes.

FIAMMINGO. [Calvert, Denis.]

FIBER. [Beaver.]

FIBRE. [Cellular, or Areolar Tissue.]

FIBRE, VEGETABLE, one of the most elementary forms of vegetable tissue. It consists of excessively delicate threads twisted spirally in the interior of a cell or tube. The fibre is solid. It is this elementary fibre which, being turned spirally round a long delicate tube with its spires in contact, forms the elastic spiral vessel.

FIBRIN, ANIMAL, a proximate principle, which is contained in the bodies of animals both in a fluid and a solid state; in the fluid state it exists in the blood, and in the solid state in muscular fibre, but the fibrin of venous blood differs from that of arterial blood. The fibrin of the blood is best obtained by what is called whipping the blood, that is, by rapidly stirring a quantity of fresh-drawn blood with a spoon or a piece of stick. During this process the blood coagulates, and the coagulum adheres to the spoon or stick. The red particles which are mixed with this coagulum may be removed by washing it in large and repeated portions of water, and afterwards treating it with æther. The substance that remains is fibrin nearly in a state of purity.

Fibrin, when fresh, exists in the state of long white, elastic filaments; it is inodorous, tasteless, and insoluble in water whether cold or hot, but by long-continued boiling a portion is dissolved. When dried at a gentle heat, it loses about four-fifths of its weight, which loss is water, and it becomes then horny and translucent, and very much resembles albumen which has been coagulated. Acetic acid and fresh fibrin, when kept for some hours in contact, form a transparent gelatinous mass which is soluble in water. Solution of potash dissolves fibrin.

The ultimate composition of fibrin has been determined by Michaelis, who made a comparative analysis of that of arterial and venous blood: the following are the results:—

	Arterial.	Venous.
Nitrogen . .	17.587	17.267
Carbon . .	51.374	50.440
Hydrogen . .	7.254	8.228
Oxygen	23.785	24.065
	100.	100.

According to Mulder dried fibrin consists of

Carbon	54.56
Hydrogen	6.90
Azote	15.72
Oxygen	22.13
Phosphorus	.33
Sulphur	.36
	100.

If it be admitted that the phosphorus and sulphur are in definite combination, the formula of this substance will be $C^{400}\ H^{310}\ N^{50}\ O^{120}\ PS$, which certainly includes a very unusual amount of equivalents. Its composition is precisely similar to that of coagulated albumen, and they have several properties in common. [BLOOD.]

That variety of fibrin which constitutes muscular fibre is so interwoven with nerves, vessels, and cellular and adipose tissue, that its properties are probably always more or less modified by foreign matters. To obtain the fibrin of a muscle, it must be finely minced, and washed in repeated portions of water at 60° or 70° till all colouring and soluble substances are withdrawn, and till the residue is colourless, insipid, and inodorous. It is then strongly pressed between folds of linen, by which it is rendered semitransparent and pulverulent.

FIBRIN, VEGETABLE, is obtained from wheat flour by the following process:—Make the flour into a paste, and wash it on a fine sieve with a small stream of water. The gluten of the flour will remain, and a milky liquid will pass through the sieve, which when suffered to rest will in a few hours become clear by depositing the starch by which it was rendered turbid. If this clear liquor be boiled, a flocculent precipitate is formed in it, which, when washed, dried, and purified by boiling æther, has the same composition as animal fibrin. When heated, it coagulates, and possesses the properties of coagulated albumen.

FI'BULA, a term used among the Romans for the broach or buckle with which their vests were usually fastened.

FI'BULA. The fibula (*péroné*, Fr., περόνη, *a pin*) is a long and slender bone swelling out at both ends, by which it is firmly attached to the outer side of the *tibia*, or main bone of the leg. The lower extremity forms the projection of the outer ancle: it is received into a deep longitudinal groove at the side of the tibia, to which it is connected by a ligamentous union, and is firmly knit to the foot by strong bands of ligament, which spread like the sticks of a fan from the tip of the ancle to the bones of the heel and instep. Nine muscles are attached to the fibula. The *biceps cruris* bends the leg back towards the thigh; three on the fore part raise and extend the toes, the remaining five unite in raising the heel, and press the toes and the ball of the foot against the ground; at the same time turning the sole outwards by lifting its external border. The muscles chiefly concerned in the last-mentioned action are the *peroneus longus* and *brevis*; their tendons pass behind the ancle, lying in a groove of the fibula, which acts as a fixed pulley to change the line of their traction, and are inserted into two bones on the outer and inner edge of the sole near the base of the toes. They are very powerful muscles, and, when they act with sudden and spasmodic force, in consequence of the foot coming unexpectedly to the ground, are capable of breaking the fibula above the ancle by pressing the foot against its projecting end. This accident happens not unfrequently from the foot slipping unawares over the edge of the curb-stone, and is complicated with various degrees of lateral dislocation, and with severe sprain of the ligaments of the inner ancle. From the name of the eminent surgeon who first delineated and described this injury, it is called Pott's Fracture.

FICHTE, JOHANN GOTTLIEB, was born in Upper Lusatia in 1762. After receiving a school education, he studied at the universities of Jena, Leipzig, and Wittemberg. He afterwards became acquainted with Kant and Pestalozzi, and in 1792 attracted general attention by his 'Versuch einer Critik aller Offenbarung' (Attempt at a Critique of all Revelation), on account of which he was made professor of philosophy at Jena. Here he began to promulgate the system of philosophy which is known under the name of *Wissenschaftslehre* (Doctrine of Science). A treatise on Faith and Providence which he wrote at Jena having brought upon him the suspicion of irreligion, he retired to Prussia, and, after living for some time at Berlin, removed to Erlangen, where he was appointed professor of philosophy, with leave to visit Prussia in the winter time.

The character of Fichte has always been held in high esteem. His 'Discourses to the German People' during the French invasion are justly valued, and he is said to have died, as he always lived, for a good cause. During his residence at Berlin in the year 1814, he urged his wife to visit the sick in the military hospital of that city; in consequence of which she caught a fever, from which she recovered, but communicated it to her husband. Fichte died at Berlin in 1814, leaving a son, Immanuel Hermann, one of the most distinguished philosophers in Germany.

Fichte's *Wissenschaftslehre* grew out of the philosophy of Kant, of whom he at first considered himself a mere disciple. The exposition of Fichte's system cannot be attempted here; but some notion of it may be derived from the article 'Fichte' in the 'Penny Cyclopædia.'

FICHTELGEBIRGE is a mountain-mass in Germany, situated between 50° and 50° 15′ N. lat., 11° 45′ and 12° E. long. Its greatest length from N.E. to S.W., between the towns of Asch and Baireuth, does not exceed 35 miles; and its average width is about 28 miles. It covers about 900 square miles. The whole mass is furrowed by narrow valleys and glens; its most elevated parts extend in plains, on which a few summits rise in the form of domes. These summits form a series arranged along the axis of the mass. Those that attain the greatest elevation are the Kösseine, the Ochsenkopf, and the Schneeberg, which rise respectively to 3024, 3328, and 3424 feet above the sea-level. The base on which the whole mass rests is about 1700 feet above the sea-

level towards the south and west, and towards the east and north about 1800 feet. The Fichtelgebirge is the centre in which three extensive mountain-ranges unite, and from which they may be considered to issue. These are the Erzegebirge, which begins near Asch, and runs off in an east-north-east direction, dividing Saxony from Bohemia; the Frankenwald (Forest of Franconia), called farther on the Thüringerwald (or Forest of Thuringia), and of which the Hartz itself may be considered as the most northern branch, springs off from the north-western extremity; and the Böhmerwald (or Forest of Bohemia), which runs off in a south-western direction. In consequence of this disposition of the mountain-ranges, the waters which issue from the Fichtelgebirge run off to the four cardinal points. The nucleus of the mass is composed of granite, gneiss, and mica-slate; but on the north-western side it is surrounded by extensive beds of clay-slate and grauwacke. It contains extensive iron-mines. Copper ore occurs frequently, but always in small quantities. Alum, serpentine, coal, garnets, tourmaline, &c., are also found.

FICI'NO, MARSI'LIO, born at Florence, A.D. 1433, was the son of Ficino, the physician of Cosmo de' Medici, who, perceiving the happy dispositions of the youth, generously provided for his education. Ficino studied Greek, and applied himself especially to the works of Plato, which he translated into Latin. He afterwards translated Plotinus, Iamblichus, Proclus, and Porphyrius, and became a great admirer of the late Platonicians of the Alexandrine school. He was one of the preceptors of young Lorenzo, Cosmo's grandson.

At the age of forty, Ficino resolved to devote himself to the church; and, being ordained, his patron Lorenzo conferred upon him a canonry in the cathedral of Florence. He now made an attempt to amalgamate the theology of Plato with Christianity, and in so doing was at times carried by his zeal beyond the limits of sound criticism. He died in 1499, at the age of sixty-six, and his countrymen raised to him a monument in the cathedral of Florence, with his bust, and an epitaph written by his friend Poliziano. His works were collected and published at Basel, 2 vols. folio, 1491.

(Roscoe's *Lorenzo de' Medici.*)

FICTIONS (in Law) have been somewhat quaintly defined to be 'those things that have no real essence in their own body, but are so acknowledged and accepted in law for some especial purpose.' These especial purposes are various. The law, it is said (by which we must understand those who for the time are the interpreters of it), shall never make any fiction but for necessity, and in avoidance of a mischief (Coke's 'Rep.' iii. 30). This is as much as to say that those who interpret the law will, in order to avoid a special hardship, or remove some unexpected difficulty not provided for by the law, resort to a fiction, that is, they will imagine something to be which is not. It is said that such fictions have always a good end in view, that is, an end considered good by those who make or maintain the fictions. It was wisely said, that fictions of law must not be of a thing impossible: but the reason is rather curious; 'for the law imitates nature.' If we object to the soundness of the reason in the instance last mentioned, we cannot but approve of the following rule as to fictions—that a man could never be subject to the penalty of a statute by a fiction of law. The law, it was said, would also make fictions in order to avoid absurdity; but this could hardly have been said in earnest.

Blackstone shows (iii. 43) by what manner of fiction the Court of King's Bench originally held pleas of all personal actions.

Fictions in law, though often ridiculous enough, have generally had their origin in some defect in the existing laws or course of procedure, and have pointed out in what respects the judges or interpreters of law, and, as we may suppose, general opinion also, under the influence of which judges must to some extent be, have felt that change was necessary. Many fictions, so far from being injurious, have often been beneficial; but their existence supposes a defect which it is the business of legislation to remedy.

FICUS, a large genus of urticaceous plants having the flowers, both male and female, mixed indiscriminately on the inside of a fleshy receptacle, which is so concave that its edges are drawn together into a narrow opening. This is illustrated by the common eatable fig, the receptacle of *Ficus carica*, which, although resembling a fruit as simple as a gooseberry, is in fact a collection of a large number of minute unisexual flowers growing to a succulent base: at its apex will be found the narrow opening where the edges of the receptacle are drawn together, and, when its interior is laid bare, the flowers are seen closely packed all over its surface, divided from each other by soft colourless bristle-like bracts or scales. What are called the seeds in the ripe fig are the pericarps, each of which contains a single seed.

The number of species of Ficus is very considerable, perhaps as great as that of any arborescent genus. They are all either tropical or inhabitants of warm countries. Some are small plants creeping upon the surface of rocks and walls, or clinging to the trunks of trees like ivy; others are among the largest trees in the forest. All travellers in the woods of South America speak of the noble aspect of the fig-trees (meaning species of Ficus not of the cultivated sort), of their gigantic dimensions, and of the thick delightful shade cast by their leafy heads. They are especially remarkable for throwing out roots from their branches, which, after they have reached the ground and established themselves there, increase rapidly in diameter, produce other branches, and thus contribute to extend an individual over a considerable space of ground. The well-known *Ficus Indica*, or Banyan-tree, and a New Holland species, are instances of this peculiar habit.

The species abound in a milky juice containing caoutchouc, and there is every reason to believe that what of this substance comes from Java is

exclusively procured by tapping different species of Ficus. The best known on the continent of India is yielded by *Ficus elastica*.

Although the fruit of *Ficus carica* and some others is eatable, yet the whole genus abounds in an acrid, highly dangerous principle, diffused among the milky secretion. This is perceptible even in the common fig, whose milk produces a burning sensation on the tongue and throat; but, when the fruit of that species is ripe, the acridity is destroyed by the chemical elements entering into new combinations. In some species it is so concentrated that they are among the most virulent of poisons. *Ficus toxicaria*, a Sumatra species, and *F. dæmona*, from Tanjore, derive their names from this circumstance, in which many more equally participate.

Ficus Indica, the Banyan-tree, is a native of most parts of India, both on the islands and the main land. Roxburgh states that it is found in its greatest perfection and beauty about the villages on the skirts of the Circar Mountains. The wood is light, white, porous, and of no value. Brahmins use the leaves as plates to eat off; birdlime is manufactured from the tenacious milky juice. The branches spread to a great extent, dropping their roots here and there, which as soon as they reach the ground rapidly increase in size till they become as large as and similar to the parent trunk, by which means the quantity of ground they cover is almost incredible. Roxburgh says that he has seen such trees full five hundred yards round the circumference of the branches, and a hundred feet high, the principal trunk being more than twenty-five feet to the branches, and eight or nine feet in diameter.

Ficus elastica, the Indian Caoutchouc-tree, is now a common tree in the hot-houses of this country. It inhabits the Pundua and the Juntipoor Mountains, which bound the province of Silhet on the north, where it grows to the size of a European sycomore, and is called Kasmeer. It is chiefly found in the chasms of rocks and over the declivities of mountains, among decomposed rocks and vegetable matter. It produces when wounded a great abundance of milk, which yields about one-third of its weight of caoutchouc. Old trees yield a richer juice than young ones. The milk is extracted by incisions made across the bark down to the wood, at a distance of about a foot from each other all round the trunk or branch up to the top of the tree, and the higher the more abundant is the fluid said to be.

Ficus religiosa, the Pippul-tree, is a large tree common in every part of India, especially near houses, where it is planted for the sake of its extensive dark grateful shade. It is held in superstitious veneration by the Hindoos, because their deity Vishnoo is fabled to have been born under its branches. Silk-worms prefer the leaves next to those of the mulberry.

Ficus sycomorus, the Sycomore Fig, is a large tree found in Egypt, where it is planted extensively by the road side, near villages, and on the sea-coast, for the sake of the shelter of its very widely spreading branches. The Arabs call it Djummeiz. Forskähl states that its head is often forty yards in diameter. The figs are sweet and delicate, and eaten by the Egyptians.

Ficus carica, the common fig, is a small tree with rough, lobed, deciduous leaves, naturally inhabiting the temperate parts of Asia, and now commonly cultivated in Europe for the sake of its fruit.

In the fertile islands of the Mediterranean, in Spain, Italy, and Greece, and even so far north as the south of France, the fruit is so well ripened as to form a valuable article of exportation in a dried state. A thousand tons are annually imported into Great Britain alone. The fruit is grown with some success even in the southern and milder parts of England, but it is seldom found in the northern parts or in Scotland, except under glass. It is only as an object of cultivation in this country that we have to consider it in this place.

The most approved methods of propagating fig-trees are either by layers or cuttings; and the former method is generally preferred, because the plants at the end of the season are stronger and more fit to be planted out where they are intended to grow. Trees raised from layers generally come into bearing the second year. Grafting succeeds upon these trees as well as upon any other, but it is almost unnecessary and seldom practised. Before the trees are planted the ground should be well drained, and made from two feet and a half to three feet deep, with a mixture of good friable loam and decayed dung. Miller remarks, that 'fig-trees bear the greatest quantity of well-flavoured fruit when growing upon chalky land where there has been a foot or more of a gentle loamy soil on the top.'

To protect the plants in winter in this country the common practice is to stick yews, spruce-fir branches, or fern leaves amongst the branches of the fig upon the wall. Where any thing can be used for protection which can conveniently be removed in fine mild weather, it will be found of greater utility than having the branches covered up from the commencement of winter until the end of spring.

The fig-tree is very apt to throw off its fruit before it ripens, and various methods have been suggested to prevent this. In the Levant, to insure a crop, the process of caprification is resorted to. [Caprification.]

FIDDLE. [Violin.]

FIDEICOMMISSUM, in the Roman law, is something given by will or codicil, not directly to the person beneficially interested in it, but to some other person, with a request that he will transfer it to the party for whom it was intended. The person thus intrusted was called Hæres Fiduciarius; and the person for whom it was intended Hæres Fideicommissarius. It was necessary that an heir (*hæres* in the Roman sense) should be named, or no property could be transmitted to the Fideicommissarius. (Gaius, ii. 248, &c.) Originally it entirely depended on the good faith of the trustee (fiduciarius) whether he performed the will of the testator or not; but, in the time of Augustus, the rights of the Fideicommissarius

were declared legal, and the consuls had jurisdiction in these matters. Afterwards prætors were expressly appointed, under the name of Prætores Fideicommissarii, to take cognizance of such trusts, but the consuls still retained their jurisdiction also. In the provinces the governors (præsides) took cognizance of fideicommissa. (Ulpian, 'Frag.' 25, 12.) Fideicommissa, or trusts, of specific things, became gradually assimilated as to their qualities and incidents to legacies.

FIELD, NATHANIEL, was professionally a player. As early as the year 1600 he was one of the Children of the Chapel, afterwards called Children of the Revels, youths who were trained to act plays before the court, and he continued in that company till after 1609. He then became a member of Shakspere's company, the players of the Globe and Blackfriars theatres, among whom he is named in the list prefixed to the folio of Shakspere's works printed in 1623. Two years later his name disappears; and in 1641 he is mentioned as 'gone,' which probably means that he was then dead. Besides these circumstances, the only ones known in his history are such as show him to have been poor and distressed. Field wrote a part of the fine tragedy of 'The Fatal Dowry,' printed among the works of its other poet Massinger. He is also the author of two comedies, written between 1605 and 1611: 'A Woman is a Weathercock;' and 'Amends for Ladies.' Both are included in a small collection, 'The Old English Drama,' 4 vols. 12mo., 1830; and in Collier's 'Supplement to Dodsley's Old Plays,' 1833. They abound in spirit, incident, and variety.

FIELD-MARSHAL, a military dignity conferred on such commanders of armies as are distinguished by their high personal rank or superior talents.

The Earl-Marshal of England had originally the chief command of the military force; but it is probable that, in or before the time of Henry VII., this office was distinct from that of marshal of the army.

The title of Maréchal de France appears to have become a military dignity in that country in the time of Philip Augustus; and originally there was but one officer of that rank: in 1270 a second was appointed. Francis I. added a third, and the number was increased by Napoleon to twelve.

The maréchaux de camp, in the old French service, were charged with the duty of arranging the encampment and providing substance for the troops. From the title borne by this class of general officers is derived that of Feld-Marschall in the German armies; and we have adopted the title from the German. The number of British field-marshals is at present six.—See the Army Lists.

FIELDING, HENRY, born April 22, 1707, was the son of General Edmund Fielding, a descendant of the Earls of Denbigh. Being designed for the bar, he was removed from Eton to the university of Leyden, but soon returned to London, plunged into the dissipation of the metropolis, and, as a means of support, between 1727 and 1736, produced eighteen comedies and farces for the stage, none of which are known or read, with the exception of two or three.

About the year 1736 Fielding married, and in about three years afterwards entered himself at the Temple, to prepare for the bar. At the usual time he was called; but gout, the consequence of his early dissipation, rendered it impossible for him to practise with regularity sufficient to insure success. Some time afterwards the publication of Richardson's novel of 'Pamela' gave him an opportunity to enter upon an employment which he found preferable to the study of law. He wrote as a satire on 'Pamela,' the history of her brother, 'Joseph Andrews;' but the author visibly warms with his subject, and draws characters which perhaps none but he could have drawn in any case, and not even he himself had he kept his primary object distinctly in view.

After the publication of 'Joseph Andrews' in 1742, Fielding wrote another play, 'The Wedding Day,' and a tract called 'The Journey from this World to the next,' which were followed by 'Jonathan Wild.' The Rebellion of 1745 induced Fielding to take the direction of a paper called 'The Jacobite Journal,' directed against the party known by that name, and in support of the Hanoverian succession. This, with other publications of the same kind, at last obtained him a small pension and the place of Justice of the Peace for Middlesex and Westminster, which he is said to have owed to the influence of Lord Lyttelton.

Amidst the laborious duties of a magistrate and pamphleteer, for Fielding was both at once, he contrived to produce 'Tom Jones,' a novel, which for graphic description, originality of characters, and interest of the tale, has been and ever will be held in the very highest admiration. The publication of 'Tom Jones' was followed by some works on the Poor Laws. He also wrote a Charge to the Grand Jury of Middlesex and some Law Tracts.

'Amelia' was Fielding's last important work. It was published in 1751, soon after which time he was attacked by dropsy, jaundice, and asthma, and, when all remedies had been tried in vain, the last remedy of self-banishment was proposed by his physicians. He left England for Lisbon, June 26, 1754, and died there in October of the same year, aged 47, leaving a widow and four children.

Fielding has been styled, with perfect justice, the father of the English novel. Sir W. Scott observes that Richardson by no means succeeded in escaping from the trammels of the French romance. But in Fielding's works we find the most perfect delineations of individual character—Squire Western, Tom Jones himself, Allworthy, and perhaps, above all, Amelia and Mr. Abraham Adams, are portraits which proclaim their own truth.

FI'ERI FA'CIAS, a judicial writ of execution issued on a judgment obtained in a personal action in the king's courts. It is directed against the goods and chattels of the defendant, and is called a writ of *fieri facias*, from the words in it whereby the sheriff is commanded 'quod fieri facias de bonis,' &c., that he cause to be made of the goods and chattels of the defendant the debt, or sum required. [Execution.] It lies against privileged persons, as peers, &c., as well as

other persons, and also against executors and administrators, so far as regards the goods of the deceased.

The sheriff is not justified in breaking open any outer doors to execute this writ; but, having peaceably obtained entrance, he may break open any inner door belonging to the defendant, in order to obtain possession of the goods. The clothes which the defendant has on or in wearing cannot be taken, and royal palaces are privileged against the sheriff's entry for the purpose of levying upon the goods of a resident therein.

If a fieri facias is issued against a clergyman, and the sheriff returns that he has no goods upon which the judgment can be levied, but that the defendant is a beneficed clerk not having any lay fee, the plaintiff may sue out a 'fieri facias de bonis ecclesiasticis,' which is directed to the bishop of the diocese, or to the archbishop during the vacancy of the bishop's see, commanding him to make of the ecclesiastical goods and chattels of the defendant within his diocese the sum therein mentioned. It is made returnable exactly in the same manner as a common fieri facias, and is executed by means of a sequestration issued by the registrar of the diocese. [BENEFICE.]

(3 Blackstone, *Com.*; Archbold, *K.B. Pract.*)

FIESCHI. [DORIA.]

FIESOLE. [ETRURIA; FLORENCE.]

FIE'SOLE, FRA GIOVA'NNI DA, frequently called, from his character, *Beato Angelico*, is one of the most celebrated of the early Italian painters. His real name was, according to Vasari, *Giovanni Guido*, and he was a distinguished member of the brotherhood of Predicant Monks at Fiesole. He was apparently born in Mugello in 1387, and he entered the order of the Predicants at Fiesole in 1409. He early distinguished himself for his miniature illuminations of religious books, of which there are still some in the convent of San Marco at Florence.

He painted also many admirable works in the Carthusian church, in Santa Maria Novella, and in the Nunziata and other churches in Florence; in San Domenico at Fiesole; in the cathedral of Orvieto; at Cortona; and in the chapel of San Lorenzo in the Vatican, and in the Minerva, at Rome, whither he had been invited by Pope Niccolò V.

The frescoes in the chapel of Niccolò V. are in great part still in a good state of preservation, though they have been restored. This chapel is described in Platner and Bunsen's 'Description of Rome,' and there are small outlines of the frescoes in D'Agincourt's 'Histoire de l'Art par les Monumens,' and larger in a special work by Giangiacomi, 'Le Pitture della Capella di Niccolò V., opere del B. Giov. Ang. da Fiesole,' Rome, 1810. These works of Fra Giovanni, though as mere abstract designs or works of art they are inferior to the works of Masaccio, are with reference to their subjects perfect in their sentiment, and in expression admirable, and have not been surpassed even by the works of any of the great painters who followed him. He died in 1455, twenty-eight years before the birth of Raphael.

FIFE, a very small flute giving acute piercing sounds. It is an octave higher than the flute, and in compass comprises two octaves. Fifes are of three sizes, named by the letters A, B, and C. The first is the lowest; the last, which is that in common use, is the highest.

FIFESHIRE, a county of Scotland, is bounded S. by the Frith of Forth, E. by the N. Sea, N. by the Frith of Tay, and W. by Clackmannan, Perth, and Kinross. It lies between 55° 3′ and 56° 25′ N. lat., and 2° 30′ and 3° 50′ W. long. The greatest length, N.E. to S.W., is about 50 miles; the greatest breadth, N.W. to S.E., about 20 miles. The area is 504 square miles, or 322,560 acres, of which more than four-fifths are arable and pasture land, and one-fifth are hills, moors, woods, &c. The population in 1841 was 140,140.

The county is one of the most pleasant and best cultivated in Scotland. The soil is of various kinds. In the most fertile districts it consists principally of a rich loam: in the poorer tracts it is mostly a wet clay, resting on a cold bed of till. A level tract of deep, rich, and very fertile loam extends from east to west along the whole southern side, varying in width from three miles to one mile from the shore of the Frith of Forth; and there are in other parts very rich tracts of land.

Fifeshire is watered by numerous streams, of which the Eden and the Leven are the chief. Fresh springs are found in almost every field. There are lakes or lochs at Leven, Fitty, and Lindores. The extensive water-boundary gives the county many excellent ports and small harbours, from which steam communication is kept up with Edinburgh, Dundee, Perth, and other places. Most of the chief towns of the county will be shortly linked together by railways.

An extensively prosecuted plan of draining and forming inclosures has considerably ameliorated the climate, by clearing the atmosphere of malaria arising from stagnant water and decaying vegetation. The air in general is dry, healthy, and exhilarating.

The county of Fife, in a geological point of view, is one of the most interesting in Scotland: it is rich in organic remains. Coal and limestone of the best description are found in abundance in almost every part of the county south of the Eden; but they are not found in the upper division, north of this river. The collieries are numerous, and some are very extensive, and employ a large number of hands. Limestone quarries are numerous in various parts of the southern district. Ironstone is plentifully obtained in several parts of the coal fields, especially near Dysart, and in the parish of Balgonie. Lead mines have been worked in the Lomond Hills. Freestone, whinstone, and many of the primitive rocks are abundantly met with. There are beds of rich marl, brick-clay, and peat. Gems are sometimes picked up in the beds of the rivers.

There are a few patches of natural wood in Fife. The plantations are numerous, and the timber in them, which is mostly aged and valuable, consists of ash, elm, beech, fir of different kinds, limes, chestnut, sycomore, and oak. Gardens are numerous, but orchards are rare. Most of the

indigenous and other animals of Britain, wild and tame, are found in this county. The farms average about 120 acres each, and are for the most part well managed. Great improvements have been introduced during the present century, both in the farm and cottage buildings, and in the system of farming.

The principal crops are of oats, wheat, and barley. Peas and beans are profitable crops in some parts of the county. Potatoes and turnips are now abundantly cultivated. Flax is grown to a considerable extent, and is used in the linen manufacture at Dunfermline and elsewhere. Rye, cabbage, coleworts, kail, tares, and carrots are cultivated to a small extent on particular farms; and meadows and pastures are abundant. Lime is cheaply obtained, and is largely used for manure.

The county of Fife has been long distinguished for the excellence of its breed of black cattle. When fat, they bring a much higher price at Smithfield market than any other kind. The Fife cows are also of high repute in the dairy. Sheep are not very numerous in Fife, but recently a large number have been slaughtered at Kirkaldy and sent by the steam-vessels to London. The flocks are small, chiefly of the Cheviot breed. Hogs and horses are reared to some extent; and so are all kinds of poultry.

Small breweries and distilleries for the manufacture of malt liquor and malt spirits, flour mills and pot-barley mills, salt-works and coal-works, tan-works and soap-works, and brick and tile works, are among the industrial establishments of the county. But the linen manufacture is by far the largest; it occupies a great number of hands, who spin and weave flax into damasks, diapers, checks, ticks, coarse sheeting, and many other kinds of linen fabrics. There are fisheries of salmon, cod, turbot, haddock, &c., off the coasts. There are a good many trading vessels belonging to the county.

Fifeshire is divided into 4 presbyteries or districts, which include 61 parishes. The county returns 1 member to parliament, the St. Andrew's District 1, the Kirkaldy District 1, and Dunfermline and Inverkeithing are included in the Stirling District, which returns 1.

The following are the principal towns, with the population of each in 1841 :—

St. Andrew's. [ANDREW'S, ST.]

Anstruther Easter and *Anstruther Wester*, two small royal burghs comprised in the St. Andrew's District, are situated at the mouth of a small stream which falls into the sea on the east coast. Easter Anstruther is on the east side of the stream, and Wester Anstruther on the west side. Easter Anstruther has one good street and a tolerable harbour, with a quay. Population, 997. Wester Anstruther has a population of 449. The harbour does not admit ships. They are both fishing towns.

Auchtermuchty is a royal burgh situated near the head of the river Eden, 9 miles W. by S. from Cupar, and 5 miles S. from the small seaport of Newburgh on the Frith of Tay. Population of the town, 2394; of the royal burgh, 1324.

Burntisland is a small royal burgh situated on the Frith of Forth, and included in the Kirkaldy District. Population, 1572.

Crail is a small royal burgh situated on the coast a short distance S.W. from Fifeness, and included in the St. Andrew's District. Population, 1221.

Cupar, called *Cupar Fife*, to distinguish it from Cupar Augus and Cupar Grange, in Perthshire, is the county town of Fifeshire. It is situated on the north bank of the Eden, at the confluence of the Lady Burn with that river, 10 miles W. from St. Andrew's. It is a very ancient place. The town consists chiefly of one long street, and contains good public buildings, a parish church, episcopalian chapel, several meeting-houses for dissenters, and numerous schools. Cupar is included in the St. Andrew's District. Population of the royal burgh, 3567; of the parliamentary burgh, 5137.

Dunfermline is situated 15 miles N.W. from Edinburgh and 3 miles N. from the Frith of Forth. It formerly contained one of the richest abbeys in Scotland, of which the nave of the church remains; and adjoining the east end is the new parish church erected in 1818. There are other interesting ruins. Fine linen is largely manufactured. There are several good public buildings—a townhouse, guildhall, gaol, assembly-rooms, besides places of worship, and many schools. It is a royal burgh, of which the population is 7865. The parliamentary borough, included in the Stirling District, has a population of 13,296.

Dysart is a small ancient town on the Frith of Forth, consisting of three narrow streets, of which the central, or high street, is full of substantial old houses, ornamented with inscriptions, dates, and piazzas under which the merchants in old times exposed their goods for sale. It is a royal burgh (population, 1478), and a contributary borough to the Kirkaldy District (population, 7057). The harbour is one of the best on the coast; but the shipping consists of only a few brigs and sloops engaged principally in the exportation of coal, corn, and other agricultural produce.

Inverkeithing is a small market-town, not far from Dunfermline, at the bottom of a bay, which occasionally affords a safe asylum for large vessels lying in the Leith roads. It consists chiefly of one street. It is a royal burgh (population, 1674), and a parliamentary borough contributory to the Stirling District (population, 1827).

Kilrenny is a small royal burgh and fishing town, a short distance N.E. from Anstruther. The royal burgh contains a population of 1652; and the parliamentary borough, which is contributory to the St. Andrew's District, 1719.

Kinghorn is a royal burgh and small fishing town, near the point of the Frith of Forth called Kinghorn Ness. It has some manufactures of flax, and is frequented as a bathing place. Population of the royal burgh, 1389; of the parliamentary borough, which is contributory to the Kirkaldy District, 1542.

Kirkaldy is a royal burgh and chief borough of the Kirkaldy District. It is pleasantly situated on the shore of the Frith of Forth, between Kinghorn and Dysart, forming one handsome

street nearly two miles in length, which has near its northern extremity the large village of Pathhead. Kirkaldy of late years has received many additions and improvements in houses and public buildings. It has an elegant modern-built church, a town-house, assembly-rooms, masonic lodge, subscription library, reading-rooms, and public grammar school. Many visitors resort to the town as a bathing place. The harbour has been rendered very commodious. Of the single article of coal about 50,000 tons are annually shipped, chiefly to places on the coast of Scotland. Corn, potatoes, sheep, and pigs also form large items of exportation to London and various other ports. There are several flax-mills, extensive manufactures of coarse linen fabrics, an iron foundry, tanneries, &c. Population of the royal burgh, 4785; of the parliamentary borough, 9778; the entire population of the Kirkaldy District being 20,236.

Pittenweem is a royal burgh and small fishing town a short distance S.W. from Anstruther. Population of the royal burgh, 1320; of the parliamentary borough, which is contributory to the St. Andrew's District, 1309.

History and Antiquities.—Prior to the 11th century, this district was either the property or wholly under the jurisdiction of the powerful Thanes of Fife, who bore the family title of Macduff. After the termination of the jurisdiction of the earls, the most considerable jurisdiction was that of the sheriffs and stewards, and the baillieries of the churchmen. Fifeshire was the district where the Scottish Presbyterian reformation commenced.

This county contains a great number of ancient edifices once the dwellings of powerful nobles, but now either fallen or falling into decay. Some of these ruins are truly magnificent, and are striking monuments of the taste and opulence of the feudal and monkish ages. In the town of St. Andrew's the remains of several superb structures are still to be seen. In Dunfermline too there are vestiges of some ancient buildings of great extent and magnificence. Near Newburgh are the venerable ruins of the abbey of Lindores. The large palace or castle of Falkland, a seat of the Macduffs, is particularly worthy of notice: the south front is yet entire, and partly inhabited. The cross of Mugdrum and the cross of Macduff, on the Ochill hills; the abbeys of Inchcolm and Balmerino; the priory of Pittenweem; the palace at Falkland; Beaton's Tower, near Monimail; the castles and towers of Rosythe, Loch Orr, Seafield, Ravenscraig, Macduff, Craig Hall, Tarvet, Balgonie, and Balwearie—are among the antiquarian remains of the county.

In this county have been found a large number and variety of the vestiges of the Caledonian and Pictish inhabitants, and of their Roman and Danish invaders, ancient military forts and mounds of encampment, groups of Druidical stones, cairns, tumuli, barrows, stone-coffins, Celtic sepulchral urns, spear and arrow heads of flint, swords and battle-axes of brass and bell-metal, crosses, fonts, beads, Roman and other coins, weapons, &c.

(*New Statistical Account of Scotland; Beauties of Scotland*, vol. iv.; Chalmers's *Caledonia*; MacCulloch's *Statistics*; *Parliamentary Returns.*)

FIFTEENTH, in music, is the interval of the double octave.

The *Fifteenth Stop*, in organs, is a range of metallic pipes, tuned two octaves higher than the diapasons.

FIFTH, an interval in music, whose ratio is $\frac{3}{2}$. There are three varieties: the *perfect* = 3 tones and 1 semitone; the *flat* = 2 tones and 2 semitones; and the *sharp* = 4 tones. [Chord; Concord.]

FIFTH MONARCHY MEN, a sect of religionists, whose distinguishing tenet was a belief in the coming of a fifth universal monarchy, of which Jesus Christ was to be the head, while the saints, under his personal sovereignty, should possess the earth. They appeared in England towards the close of the Protectorate; and in 1660, a few months after the Restoration, they broke out into a serious tumult in London under their leader Venner, in which many of them lost their lives, some being killed by the military, and others afterwards executed.

FIG. [Ficus.]

FIGEAC. [Lot.]

FIGUEIRA. [Beyra.]

FIGUERAS. [Cataluña.]

FIGURE (Geometry), a finite space, which has a boundary in every direction. The figure of a space is the notion we receive from observing its boundary.

FIGURED BASE. [Thorough Base.]

FILA'GO, a genus of plants belonging to the natural order *Compositæ*. *F. germanica*, a cottony plant with yellow florets, is a native of Great Britain, as well as *F. minima* and *F. gallica*.

FILAMENT, in Botany, the part of the stamens which bears the anther. It is sometimes long and slender; hence its name filament. In some plants however it is nearly or altogether absent, and is not unfrequently flat and broad. [Stamen.]

FILANGIE'RI, GAETA'NO, was born at Naples in 1752, of a noble family. In 1774 a reform in the judicial administration was determined on by the ministers of King Ferdinand, by which the judges of the various courts were in future to explain the grounds of their decisions by referring to some existing law applicable to each respective case, and, in default of such a law, to ask the king for his decision. This determination, which checked the till then absolute discretion of the courts, was strongly opposed by the judges, supported by most of the law practitioners, as offensive to the dignity and independence of the courts, and they published a violent memorial on the occasion. Filangieri took up the matter, and wrote a reply showing the absurdity and impertinence of the objections, as insulting alike to the liberty of the citizens and to the authority of the crown: 'Riflessioni Politiche sulla Legge Sovrana del 23 di Settembra del 1774.'

In 1780, Filangieri published the first volume of his great work, 'Scienza della Legislazione,' which made him known throughout Europe; he went on publishing the successive volumes in the following years. In 1787 he was appointed a

member of the Supreme Council or Board of Finance, a department which stood also in need of reforms. He died in July 1788, thirty-six years of age, regretted by all Naples, and leaving his work on legislation incomplete. The work however has gone through many editions, and has been translated into several languages; one of the best editions of the Italian text is that of the 'Classici Italiani,' 6 vols. 8vo., Milan, 1822, to which are added his 'Opuscoli Scelti' or minor works. Among the translations the French one, Paris, 1822, contains a biography of Filangieri by his countryman, Salfi. Benjamin Constant wrote a 'Commentaire sur l'Ouvrage de Filangieri,' 2 vols. 8vo., Paris, 1822—24.

Filangieri died young, and his work on 'Legislation' should not be judged too severely. He suggested some good ideas, and had an honest purpose; but his labours do not entitle him to a high place among political writers. He adopted the theory of an original social contract, a theory which, if followed out to his consequences, must lead to false results.

FILBERT, the fruit of a variety of *Corylus avellana*. [CORYLUS.] The term was originally applied to those kinds of nuts which have very long husks; but, owing to the number of varieties that have of late years been obtained, this distinction, which was never scientific, appears to be nearly disregarded, and nut and filbert are almost synonymous terms, excepting that the wild uncultivated fruit, and those varieties which most nearly approach it, are never called filberts.

The best sorts are the following:—

Frizzled Filbert, excellent bearer; Red Filbert, and White Filbert, bad bearers; Cob-Nut, a very prolific kind; Bond-Nut; Cosford; large square Downton; Northamptonshire, prolific.

According to the most skilful cultivators, the soil on which the filbert succeeds best should consist of 'a hazel loam of some depth, upon a dry subsoil;' but, as this is not always found convenient, it should be remarked that it is not essential to the growth of the filbert, and some even recommend a dry poorish soil. The ground should be frequently dressed (at least once in two years), and a small quantity of manure given; woollen rags are often used for this purpose with the greatest success, but manure of any kind will be found beneficial.

Filberts are most successfully propagated by layers or suckers. The method of pruning depends in a great measure upon the object the cultivator has in view: if dwarf trees are wanted, the layer or sucker is shortened to about one foot and a half or two feet; if what are termed riders be desirable, then the stem is cut much higher; but if the shoot is weak it is better to cut it near the ground, and leave it the proper height at the next year's pruning. Afterwards, when any sucker makes its appearance at the bottom of the stem, it should be carefully removed, and not allowed to draw the nourishment from the parent plant. (Lindley's 'Guide,' &c.)

About Maidstone, and in other parts of Kent, the management of the filbert is better understood than in any other part of this country; and, as the soil and other circumstances seem to suit its growth, immense quantities are grown for the London market.

The filbert is a monœcious plant, having its male organs in one flower and its female in another; and one modern writer, suspecting a want of male blossoms to be the cause of failure in particular seasons, suspended a quantity of the catkins of the common hazel over the female blossoms of some of his filberts, the result of which was a greater quantity of fruit than his trees had borne for many years. He then tried some with the male flowers, and others without, when the former bore fruit, and the latter proved abortive, as he had anticipated. He therefore recommends unpruned hazels to be planted among the cultivated filberts, in order that impregnation may be effected.

Great quantities of filberts are rendered useless by being attacked by the Nut Weevil (*Balaninus Nucum*), which perforates the nut in its young state, and deposits its egg: in a few days the maggot is hatched, and then feeds upon the kernel. Some recommend the trees to be shaken in June or July, as this is the time when the insect makes its appearance, but no remedy is known which can be said to be effectual.

In order to preserve filberts in a fresh and plump state, it is only necessary to prevent their parting with their moisture by evaporation. Burying them in heaps in the earth, putting them in earthen jars in a wine-cellar, covering them with dry sand, are all very good plans, and many others equally efficient will suggest themselves.

FILE, a steel instrument having flat or curved surfaces so notched or serrated as to produce a series of fine teeth, or cutting edges, which are employed for the abrasion of metal, ivory, wood, &c.

Steel for making files, being required to be of unusual hardness, is more highly converted than for other purposes, and is sometimes said to be *double converted*. Small files are mostly made of cast steel. The very large files called smiths' rubbers are generally forged immediately from the converted bars. Smaller files are forged from bars which are wrought to the required form and size by the action of tilt-hammers, either from blistered bars or from ingots of cast steel. These bars are cut into pieces suitable for making one file each, which are heated in a forge fire, and then wrought to the required shape on an anvil by two men, one of whom superintends the work, while the other acts as general assistant.

The next operation upon the blanks which are to be converted into files is that of softening or 'lightening,' to render the steel capable of being cut with the toothing instruments. This is effected by a gradual heating and a gradual cooling. The surface is then rendered flat and smooth either by filing or by grinding.

The cutting of the teeth is usually performed by workmen sitting astride upon a board or saddle shaped seat, in front of a bench, upon which is fixed a kind of small anvil. Laying the blank file across the anvil, the cutter secures it from moving by a strap which passes over each end and under his feet, like the stirrup of the shoemaker

He then takes in his left hand a very carefully ground chisel made of the best steel, and in his right a peculiarly shaped hammer. If the file be flat, or have one or more flat surfaces, the operator places the steel chisel upon it at a particular angle or inclination, and with one blow of the hammer cuts an indentation or furrow, completely across its face, from side to side, and then moves the chisel to the requisite positions for making other similar and parallel cuts. If it be a half-round file, as a straight-edged chisel is still used, a number of small cuts are necessary to extend across the file from edge to edge. So minute are these cuts in some kinds of files, that in a file about ten inches long, flat on one side and round on the other, there are more than 20,000 cuts, each made with a separate blow of the hammer, and the cutting-tool being shifted after each blow.

Several highly ingenious machines have been contrived for superseding the tedious operation of file-cutting by hand; but, suited as the process may appear to be for the use of machinery, it has been found to present such great difficulties, that we believe no file-cutting engine has been brought successfully or extensively into operation. One very serious difficulty arises from the circumstance that, if one part of the file be either a little shorter than the adjacent parts, or narrower, so as to present less resistance to the blow of the hammer, a machine would, owing to the perfect uniformity of its stroke, make a deeper cut there than elsewhere.

After the files have been cut, the steel is brought to a state of great hardness; this is effected in various ways, according to the purpose to which the file is to be applied: they are generally coated with a sort of temporary varnish, then heated in a stove, and then suddenly quenched. After hardening, the files are scoured, washed, dried, and tested.

FI'LICES, or FILICA'CEÆ, a natural order of plants, being the highest group of the class *Cryptogamia* or *Acrogens*. The species are flowerless plants, consisting of leafy fronds, which are produced from a rhizoma unfolding in a spiral manner, and traversed by veins which form definite parts on the under surface, and produce unilocular, rarely multilocular, cases containing reproductive sporules.

The position of the *Ferns* in a natural system of classification has not been a matter of much difference. Their imperfect organs of reproduction have at once led to their being placed by most botanists among Cryptogamia; nevertheless Bory St. Vincent elevates Ferns to the rank of a class intermediate between Monocotyledons and Acotyledons or Cryptogamia; at the same time he rejects the view of Jussieu, who from the mode of germination of their sporules placed the Ferns among the Monocotyledons. Their relation with the flowering plants is seen through Cycadaceæ, with which order they agree in their gyrate vernation and their pinnate leaves. Their affinity with cryptogamic plants is obvious in the Equisetaceæ and Lycopodiaceæ. The order of Ferns may be divided into the following sub-orders, which Lindley regards as of the rank and value of orders.

I. GLEICHENIACEÆ, the species of which are tropical, or extra-tropical only in the southern hemisphere, of a harsh and rigid texture, simple or generally with copious dichotomous branches and gemmæ in the axils; the ultimate branches pinnatified. None of the genera of this order, as understood by Hooker, are British. It includes about forty species.

II. POLYPODIACEÆ, a very extensive sub-order: the species inhabit almost every part of the world, from the tropics to the arctic and antarctic regions; they are exceedingly variable in size and appearance, including the largest tree-ferns and the smallest herbaceous species. It contains by far the largest number of genera of any of the sub-orders of the Ferns. Many of these are very extensive, and have no British representatives, as Cyathea, Hemitelia, Alsophila, Dicksonia, &c.

III. OSMUNDACEÆ. The species of this sub-order are not numerous.

IV. DANÆACEÆ. This is also a small sub-order, with three genera—Danæa, Marattia, and Kaulfussia.

V. OPHIOGLOSSACEÆ embrace the genera Ophioglossum, Helminthostachys, and Botrychium.

The ferns have a wide geographical distribution, the herbaceous and shrubby kind being found towards the north and south poles; whilst the tree-ferns rival the gigantic palms in the forests of tropical climates. It is these last which give a peculiar character to the vegetation of the countries where they grow, as their foliage and stems differ altogether from any that are observed amongst flowering plants. The proportion which they bear to other plants varies much in different parts of the world.

The properties and uses of the ferns are not in proportion to their numbers in the vegetable kingdom. Many of them deposit starch in their rhizomata, from which food may be prepared. The roots of Nephrodium esculentum are eaten in Nepaul; those of Angiopteris evecta are used in the same manner in the Sandwich Islands. Diplazium esculentum, Cyathea medullaris, Pteris esculenta, and Gleichenia dichotoma, all yield starch, and are employed as food in different countries. [CYATHEA.] The Adiantum Capillus Veneris yields astringent and aromatic secretions. [ADIANTUM.] Some of the American polypodiums are said to possess powerful medicinal effects, and are used as antirheumatic, antivenereal, and febrifugal remedies. The Angiopteris evecta yields an aromatic oil, which is used in the Sandwich Islands to perfume the fixed oils, as cocoa-nut oil. The stems of many species contain bitter principles, and have hence been used as tonics. Species of Aspidium and Asplenium have been used in European medicine. [ASPIDIUM; ASPLENIUM.] The Brazilian negroes form tubes for their pipes from the stems of Mertensia dichotoma. Osmunda regalis had once a great reputation in medicine.

(Babington, *Manual of British Botany;* Lindley, *Natural System;* Hooker, *Species Filicum;* J. Smith, *The Genera of Ferns; Journal of Botany*, vol. iv.; Newman, *History of British Ferns;* Burnett, *Outlines of Botany:* Meyen, *Pflanzen-Geographie.*)

FILIPE'PI, SANDRO or ALESSANDRO, commonly called *Botticelli*, was born at Florence in 1437. He studied painting under Filippo Lippi, and painted many pictures for the churches of Florence, some of which are still preserved, and are now in the gallery of the Florentine academy. He painted a small picture for the church of Santa Maria Novella, representing the adoration of the kings, in which the kings were portraits of Cosmo, Julian, and Cosmo's son, Giovanni Medici. This was one of Sandro's masterpieces. He painted also for Sixtus IV., in the Capella Sistina, at Rome, three pictures from the history of Moses and the Israelites, his largest and best works. After this he abandoned painting, and gave himself up to Savonarola, and to Dante's 'Inferno,' which he illustrated, and attempted to engrave his designs; but those attributed to him are miserably executed; they are however scarce, and fetch very high prices. Sandro, after his connection with Savonarola, neglected his worldly concerns, and would have starved had it not been for the bounty of Lorenzo de' Medici: he survived Savonarola many years, and died at Florence in 1515.

FILLET, a flat rectangular moulding, of very frequent occurrence in architecture. It is used to terminate or divide other mouldings, as in the cavetto, which is surmounted with a fillet, and in the flutings of columns, which are divided by a fillet. The fillet is much used in entablatures.

FILTER, a strainer used in chemical operations for rendering fluids transparent by separating the suspended impurities which make them turbid; or for separating and washing the precipitates resulting from chemical analysis.

Filters are usually made of unsized or blotting paper; and they are used either spread out upon cloth stretched on a wooden frame, or folded and placed in funnels, and having consequently the form of an inverted cone. They are either single or double, according to the purposes to which they are to be applied. Various forms of filter are employed for the purpose of filtering water, either for drinking or culinary purposes. These filters generally depend upon passing water through sand or small pebbles and charcoal. It is well known that the Thames water, though it contains but little saline matter in solution, is frequently turbid, owing to mechanical admixture of earthy matter, which the filters in question are well calculated to remove, so as to render the water, though not so agreeable as spring-water for drinking on account of its flatness, yet well adapted for other purposes.

FIN. [Fish.]

FINA'LE, the concerted piece of music by which the acts of an opera conclude: the last movement of a symphony, concerto, &c.

FINALE. [Albenga, Province of.]

FINCH. [Fringillidæ.]

FINE OF LANDS, one of the modes of conveying lands and hereditaments by matter of record. It was so called because it put an end (*finis*) not only to the actual suit of which it was the conclusion, but also to all other suits and controversies concerning the same matter. Divested of its technicalities, a fine may be described to be an amicable composition or agreement of a suit, either actual or fictitious, by leave of the king or his justices, whereby the lands in question become, or are acknowledged to be, the right of one of the parties.

A fine was principally used as the mode of conveying the estates of married women, and renouncing their right to dower, as a means of barring estates tail, and remainders and reversions dependent upon other estates, and also for the purpose of strengthening defective titles.

By the 3rd and 4th Will. IV. c. 74, fines are abolished, and provision is made for the conveyance of the interests of married women in land, with the concurrence of their husbands, and after being examined to ascertain if they are acting voluntarily, by a deed to be acknowledged in the Court of Common Pleas; and provision is also made for the barring of estates tail by a deed enrolled. The work of Cruise 'On Fines' contains the history of fines, and the mode of proceeding in levying a fine.

FINGER. [Skeleton.]

FINGER-BOARD, the whole range of keys, white and black, of a piano-forte or organ.

FINIGUERRA. [Engraving.]

FINISTE'RE, a department of France, which comprehends the greater part of Basse-Bretagne, is bounded N. by the English Channel, E. by the departments of Cotes-du-Nord and Morbihan, S. and W. by the Bay of Biscay and the ocean. It extends between 47° 44′ and 48° 47′ N. lat., and between 3° 22′ and 5° 2′ W. long. Its greatest length from N. to S. is 78 miles, from E. to W. 63 miles; but the average breadth does not exceed 44 miles. The area is 2574 square miles, and the population in 1841 was 576,068, which gives 223.8 to the square mile, being 55.79 above the average per square mile for all France. A vast number of islands and rocky islets lie off the coast. The most important of these are—Bas: *Ouessant* (Ushant), 13 miles from the main land, from which it is separated by the Passage du Four; it is about 18 miles in circuit and fertile; but the coasts are rocky and very difficult of access; horses and sheep are reared; the population amounts to 2194, many of whom are pilots and fishermen; besides the village of St.-Michel, there are on the island several hamlets, a strong castle, some Druidical structures, and a lighthouse of the first class: the group of the *Balances* and the isle of *Beniguet*, which lie between Ouessant and the Cape St. Matthieu, at the entrance to Brest Harbour: *Sein*, a low, barren, and rocky island, nearly 2 miles W. of Cape Raz, inhabited by fishermen: and the *Glenans*, a group of nine islets on the south coast, opposite Cape Trevignor.

The department presents to the sea a bold barrier of granite rocks, at the foot of which there are here and there extensive sands and beaches. The coast line measures above 360 miles, reckoning all its windings: it is indented by a great number of bays and inlets, corresponding to an equal number of valleys or depressions in the land, out of which flow as many rivers or brooks. The largest of these inlets are on the west coast, forming the

harbour and roads of Brest, the bay of Douarnenez, famous for its pilchard fishery, and the bay of Audierne. The coast is dangerous to mariners, and exposed to great storms from the south-west. Lighthouses are built on all the principal headlands. The interior of the department is hilly; two offshoots of the Armoric range [COTES-DU-NORD] cover a great part of the surface, namely the Arré Mountains in the north, and the Montagnes Noires in the south; but they nowhere exceed 900 feet in height. The number of Druidical stones in this department is great.

The rivers are very numerous, but their course is short. The most important are—the *Aulne*, which flows from Côtes-du-Nord westward, past Châteauneuf and Châteaulin; from this last town to its entrance into Brest Roads it is a tide river and navigable; its principal feeders are the Elèze, the Doufine, on the right bank, and the Hière on the right: the *Elorn*, which also enters the Brest Roads, and forms the harbour of Landerneau: the *Odet*, which passes Quimper, where it receives the Benodet, and becomes navigable to its mouth in the Bay of Benodet: and the *Ellé*, which enters the south-eastern angle of this department from that of Morbihan, receives the Isok or Issole at Quimperlé, whence, to its entrance into the Bay of Biscay, it separates Morbihan from Finistère. The scenery along these rivers is exceedingly beautiful, and in most of them there is good trout-fishing.

The department contains 1,647,523 acres, distributed among 95,356 proprietors, and subdivided into 1,646,440 parcels. Of this surface 675,141 acres are arable, 101,094 are natural pasturage, 84,524 are covered with woods and forests, 24,797 are laid out in orchards, nurseries, and gardens, and 658,681 consist of heath and moorland. The best soils are near the coast or in the neighbourhood of the rivers. The old district of Léon, which forms the western part of the arrondissement of Morlaix, is the best soil in all Bretagne; but the eastern part of the arrondissement, which is called Tréguier, is poor and ill cultivated. The arrondissement of Brest comprises some very fertile lands; a remarkable breadth of land is appropriated here to the growth of strawberries. With the exception of the canton of Pont-l'Abbé, which consists of excellent well-tilled soil, the arrondissement of Quimper has but little good land. The arrondissement of Quimperlé is a pretty and well-wooded country, but the soil is in general light. The most unproductive part is the arrondissement of Châteaulin, which consists almost entirely of vast moors and heaths. Here, the people being for the most part shepherds and cattle-breeders, sheep, horses, oxen, and cows, all of the Breton breed and small, form their chief wealth. Almost the only crop raised in this district for the sustenance of man is black oats; and whenever this fails the district is visited by famine.

However backward the state of agriculture may be in this department, more wheat and rye are produced than are required for consumption. Barley, oats, buckwheat, great quantities of peas and beans (which form a large part of the food of the peasantry), and kitchen vegetables, are also grown.

Other objects of cultivation are flax, hemp, tobacco, and cider fruits, yielding annually about 1,540,000 gallons of cider. Besides the animals before mentioned, great numbers of excellent pigs are bred. Bees and game (deer, wild boars, partridges, &c.) are abundant. Eels, trout, salmon, lobsters, and oysters are plentiful; but the pilchard fisheries along the coast afford the most profitable occupation to the Breton fishermen. In this pursuit more than 1000 vessels of small size, and about 4000 men, are employed, and a gross annual value of 2,000,000 francs is obtained. This includes the value of the enormous quantities of the common pilchard (4,400,000 lbs.), the anchovy pilchard, caught off Concarneau in Forêt Bay (1,100,000 lbs.), and a large quantity of oil pressed from fish which are not cured. These fisheries form an excellent nursery for the French navy, which draws its best seamen from Bretagne.

Iron, coal, lead, bismuth, and zinc mines are worked. An excellent stone, easily worked, and capable of resisting the action of the weather, is found at Daoulas and one or two other places near the Brest Roads: it is of a light green colour, and when worked presents the appearance of bronze. It is called *Kersanton* stone, and of it several of the churches in the department are built. Granite, marble, building stone, and slates are quarried; potters' clay, kaolin, and whetstones are found. There are cold mineral springs at various places in the department. The manufactures consist of sailcloth, linen, soda, soap, seed oil, candles, ropes, pottery, paper, leather, refined sugar, litharge, and tobacco. Ship-building is carried on at Brest and in most of the large towns on the coast. The commerce of the department is composed of the various products already named, and of wine, brandy, beer, Dutch cheese, butter, salt, and colonial produce. About 450 fairs are held. Roadway accommodation is afforded by ten royal and five departmental roads.

The climate is damp and foggy; the average number of rainy days in the year is 220; sometimes the rain falls, almost without cessation, for weeks together. Frost and snow are rare. Fine days are few even in summer; and in the same day one may experience the climate of the four seasons, so great is the variation of temperature. Storms are very frequent along the coasts; and nowhere in the world are the terrible sublimities of a raging sea seen to greater advantage than near the village and promontory of Penmarck; the sound of the waves dashing against the rocks is often heard to a distance of 12 and 18 miles inland. The prevailing winds are the west, south-west, and north-west.

The Bretons are an interesting people, strongly attached to their religion, their old customs, and to their language, which is a dialect of the Celtic. Most of them understand French, but few of them speak it. All the members of a Breton family eat off the same dish, the master of the house commencing first, next his male children and men-servants, then the wife, daughters, and female servants. In every thing the men take precedence of the women. The habitations of the peasantry are mostly long narrow smoky huts, with a single

window, and divided by a frail partition into two apartments, one of which is occupied by the man of the house, his wife, children, and it may be his grandchildren; the other contains the cows, calves, pigs, and other animals of the farm. Two large cupboards without doors, consisting of two stories, and separated into several small apartments, which are strewed with hay or straw, form the sleeping places of the whole establishment. Feather-bed or mattrass is equally unknown; a blanket is rare, the most usual night cover being a cloth made of coarse tow yarn, or sometimes a piece of haircloth. The men, who in general wear their hair long, are dressed in broad-brimmed hats, short waistcoats, breeches of vast size, gaiters, and sabots; in some districts they are wrapped up in goat skins. The costume of the women is in general neat and attractive. In connection with the Breton churches there are *reliquiaires* or bone-houses, into which the bones of the dead are gathered after a certain number of years by the surviving relatives, and in which the skulls, each marked with the name or initials of its former owner, are arranged on shelves open to view.

The department is divided into five arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1841.
Quimper . .	9	65	109,775
Brest . . .	12	85	182,663
Châteaulin . .	7	„	100,520
Morlaix . . .	10	58	139,912
Quimperlé . .	5	„	43,198
Total . . .	43		576,068

In the arrondissement of Quimper the chief town, *Quimper*, which is also the capital of the department, is built in a pretty situation on the slope of a hill at the junction of the Eir with the Odet, 330 miles W. from Paris, and has 10,154 inhabitants. The town is in general ill built; but the more modern part of it contains some good houses. The principal public buildings are—the cathedral, which dates from 1424, and is the largest of the cathedrals of Basse-Bretagne; the church of St. Matthieu, an ugly edifice; the church of the priory of Locmaria, which stands at the end of a long and beautiful promenade on the left bank of the Odet, and part of which has stood since the tenth century; the manor-house of Poulquinan, which stands on a height near the last-mentioned church, and is said to have been the residence of King Grallon. The other remarkable objects are, the military hospital, the theatre, the public baths, the residence of the prefect, and behind it a fine promenade, cut out in zigzag avenues up a wooded hill above 650 feet high, from which there is a very extensive view. The town has tribunals of first instance and of commerce, an ecclesiastical school, a communal college, held in a large building which formerly belonged to the Jesuits. Vessels of 300 tons come up to the town. The chief industrial establishments are potteries, tan yards, breweries, nurseries, ship-building yards. The pilchard fishery is actively carried on, and there is a good trade in corn, wine, brandy, honey, butter, dry and salt fish, iron, wool, hemp, flax, linen, and cattle. Steamers ply regularly from this town to Nantes. The other towns are—*Briec*, 9 miles N.N.E. from Quimper, with 5149 inhabitants: *Concarneau*, partly on an island in the bay of Forêt and partly on the main land, is a small fortress with 1984 inhabitants, who are almost all engaged in the fisheries along the coast, and take from 12 to 15,000 barrels of pilchards and anchovies every year: *Douarnenez*, at the head and on the north shore of the bay of Douarnenez, which has 3646 inhabitants engaged in the profitable fishery of the bay, the yearly produce of which is about 35,000 barrels of pilchards and 15 to 16,000 barrels of oil; the islet of Tristan, which contains storehouses for the fish, stands near the town, and is defended by a battery of twelve guns: *Fouesnant*, a village S. of Quimper and near the sea, which has 3172 inhabitants: *Pont-Croix*, 18 miles W. of Quimper, which has an ecclesiastical school and 2175 inhabitants; it stands on the top of a high hill, and consists of ill-built houses and steep streets; there is a splendid view of the storms of the Bay of Biscay and the Atlantic from this place: and *Pont l'Abbé*, which stands at the head of an inlet from Benodet Bay, and has a good harbour and 3325 inhabitants, who manufacture linen, and trade in wine and agricultural produce.

In the arrondissement of Brest, the chief town is BREST. *Landerneau*, a small seaport 15 miles E. from Brest, has 4906 inhabitants. It stands at the mouth of the Elorn, which here forms a harbour surrounded by hills high and steep on the left bank of the river, but sloping gradually on the right bank into a plain on which the chief part of the town is built. The upper town contains some very ancient structures; a house on the bridge over the Elorn bears the date 1518. The town has a very agreeable appearance; clear streams run from the hills through all the streets into the harbour, which is lined with extensive quays. The principal buildings are the church of St. Houardon, the marine hospital and barracks. A promenade, nearly a mile in length and well planted, leads from the town to a vast building occupied as a nunnery. The chief manufactures are leather, linen, and glazed hats. There are also bleaching establishments, and a good trade in canvass, linen yarn, pitch and tar, Dutch cheeses, corn, horses, &c. *Lannilis* stands 15 miles N. of Brest, in a picturesque country watered by the Aber-Benouhic, and has 3124 inhabitants. *Lesneven* stands on a height that rises from the middle of a fertile plain, and has an hospital and 2832 inhabitants. Near this place is the church of Notre-Dame-de-*Folgoat*, which is built of Kersanton stone, and for the delicacy of its sculptured and carved work, its beautiful portals and windows, but especially for its magnificent Rood-loft, is acknowledged to be without a parallel in this part of France; it was founded by John de Montfort, and finished under his son John V., duke of Bretagne in 1423. *Plabennec* stands on a hill 9 miles from Brest, and has 3555 inha-

bitants. *Plouarzel*, N. of Brest, has 2214 inhabitants; on a hill close to it is a *menhir* or Druidical granite monolith, which is 43 feet high. *Ploudalmézeau*, 12 miles N. from Brest, contains some ancient houses of remarkable construction, and has 3209 inhabitants.

In the arrondissement of Châteaulin the chief town, *Châteaulin*, an ill-built place, stands in very pretty country, on the Aulne, which divides it into two parts, and forms a small harbour to which barks of 80 tons go up. On a hill above the river are seen the ruins of the ancient castle of the lords of Châteaulin, which was built in 1000 by Budie, count of Cornouailles. The trade of the place consists in cattle, fish, butter, iron, lead, slates, &c. *Le-faon* is a small place at the head of the bay of Brest. *Carhaix*, an ill-built town, stands on a high hill above the little river Illiers, nearly in the centre of Basse-Bretagne, and has a population of 2021. It is considered important in a military point of view; six great roads lead from it to Brest, Quimper, Châteaulin, Vannes, St.-Brieuc, and Morlaix. *Châteauneuf-du-faon*, beautifully situated on the southern slope of a hill above the Aulne, which here winds its way through rich meadows and turns several corn mills, has a population of 2536. *Crozon* is a small place on the peninsula, between the bay of Douarnenez and Brest Roads; there are caverns near it inhabited by vast numbers of sea birds. *Huelgoat*, a small place with 1156 inhabitants, and *Poullaouen* near it with 3700, have rich lead mines and smelting furnaces, which yield 10,000 cwt. of lead and 1500 lbs. of silver annually. *Pleyben*, E. of Châteaulin, has a fine Gothic church and 4672 inhabitants.

In the arrondissement of Morlaix, the chief town *Morlaix*, a seaport with 10,539 inhabitants, is very prettily situated at the foot of two hills, and at the junction of the Jarleau and the Kevleut, which throw their waters into a creek from the English Channel that forms the harbour. Vessels of 300 to 400 tons come up to the quays at flow tides, which rise from 13 to 23 feet; the entrance however is very intricate and dangerous, from the number of rocks and islets. The river and the harbour divide the town into two quarters, the side of Léon to the west, and the side of Tréguier to the east. In the latter the houses are almost all ancient and the streets irregular. The side of Léon is more regular; it has a large square, surrounded by handsome modern houses, and in the centre of it, on the site of the old town-house, which was demolished in 1836, stands an elegant structure occupied by the tribunals of first instance and of commerce, the mayor's offices, and by the linen and corn markets. Modern structures have replaced many of the curious timber-framed houses of the old town; but in several parts are still seen façades ornamented with sculptures and very remarkable interiors. The St.-Martin quarter, built on high ground, which is ascended by a great number of steps, is the finest part of the town: it has a pretty modern church surrounded by fine gardens, from which there is an extensive view. The other remarkable objects are—the churches St. Matthieu, St. Mélaine, the tobacco manufactory on the hill of Léon, and the Cours Baumont, a beautiful promenade which extends above a mile along the harbour. The town has a school of navigation, manufactures of linen, oil, and candles, besides a considerable trade in butter, corn, seeds, hides, pigs, cattle, sheep, horses, linen, linen thread, paper, flax, hemp, wine, and brandy. It is an entrepôt for foreign produce. The winding channel between the town is navigated by steamers, and affords much delightful scenery. Mary, queen of Scots, landed here in 1548 on her way to Paris to espouse the dauphin. *Landvisiau*, a well-built town, stands on a high hill 12 miles W. from Morlaix on the road to Brest, and has 3217 inhabitants; it is remarkable for its church, which has a lofty bell tower, supported on slender pilasters; these under certain aspects are lost to the view of the approaching traveller, so that the tower seems suspended in the air. *Lanmeur*, an ancient place, with 2750 inhabitants and two very ancient churches, one dedicated to Notre-Dame-de-Kernitroun, which was built about the middle of the 12th century and is perfectly preserved, and the church of St.-Mélair, which dates from the early part of the 11th century, and is built over a crypt which belongs to a much earlier period. In the crypt there is a fine fountain, for which the Bretons have great reverence. *Plouescat*, near the coast, has 3314 inhabitants; near it are seen some Druidical stones of great size. *Roscoff*, a small town on the coast opposite the isle of Batz or Bas, has a pretty good harbour sheltered by a jetty; the population, which consists chiefly of smugglers and sailors, amounts to 3640. *Sizun*, S.W. from Morlaix, has 3758 inhabitants, who are engaged in agriculture and the linen manufacture. *St.-Pol-de-Léon*, on a hill above the sea 10 miles N.N.W. from Morlaix, is a clean but ill-built town. It possesses two noble churches—the former cathedral which is remarkable for its delicate wood-carving and sculptured ornaments, and contains the tomb of St. Léon; and the church of Kreizker (middle of the town) built towards the end of the 14th century by John IV., duke of Bretagne. The square bell tower of this church, surmounted by a cornice and an elegant balustrade, from which springs a lofty spire flanked by four turrets, the whole built of granite, is the finest work of the kind in France. The summit and spire is 404 feet high, being the highest spire in France, except that of Strasbourg. A suburb called Penpoull is built on the sea-shore, and forms the port; it contains several houses of remarkable construction; some of them are fortified. The population amounts to 6655. This town, formerly the seat of a bishop, is now going to decay. *St.-Thégonnec*, S.W. from Morlaix, is the centre of a considerable linen manufacture, and has 3929 inhabitants, and a fine church built of granite. *Toulé*, N. from Morlaix, has paper-mills, and 2905 inhabitants.

In the arrondissement of Quimperlé, the chief town *Quimperlé*, a small sea-port situated at the junction of the Isole and the Ellé, and surrounded by high hills, has a communal college, and 5261 inhabitants, who manufacture leather, paper, and sabots. Vessels of 50 tons come up to the town, and unload their cargoes at a large quay lined with

stores and handsome houses. The Benedictine convent, now the residence of the mayor, is an imposing building; behind it is the interesting round church of Sainte-Croix, which dates from the 11th century. On one of the hills above the town stands the Gothic church of St.-Michel, the Capuchin and Ursuline convents, which with several pretty houses, gardens, and orchards, render this a very agreeable part of the town. *Bannalec*, N.W. of Quimperlé, famous for the wrestling matches held near it every September, at which every variety and oddity of Breton costume may be seen among the numbers drawn together to witness and take part in the national game, has a population of 4264. *Pont-a-ven* is a small place near the mouth of the Aven, with a small harbour for vessels of 60 or 70 tons. *Scaer*, N.N.W. of Quimperlé, stands on an eminence on the right bank of the Isole, and has 4005 inhabitants. From the tower of the church of Scaer is one of the most extensive views in Bretagne. Near the town is the beautiful well of Sainte-Candide, the basin of which is 76 feet long, 16½ wide, and 7½ deep.

The department forms the see of the Bishop of Quimper, is comprised in the jurisdiction of the Cour Royale and University Academy of Rennes, and belongs to the 13th Military Division, of which Rennes is head quarters. It used to return 6 members to the Chamber of Deputies; it now has 15 representatives in the National Assembly.

(*Dictionnaire de la France; Statistique de la France; Decree of the Provisional Government of the French Republic;* Murray's *Hand-book of France.*)

FINITE (in Mathematics), having a boundary, used as opposed to INFINITE.

FINLAND forms a Russian government, which is composed of Finland, of the two Lapmarks of Kemi and Tornea, and of the province of Wiborg. It lies between 59° and 70° N. lat., and 28° and 31° E. long. On the north its boundary is Norway; on the north-east, the government of Archangel; the east, Olonetz; the south-east, St. Petersburg; the south, the Gulf of Finland; the south-west, the Baltic; the west, the Gulf of Bothnia; and the north-west, Sweden. Its area is about 111,000 square miles, and the population about 1,500,000.

The surface of Finland, in the eastern and central parts, is intersected by lakes, rivers, and swamps, between which there are flats of sand overgrown with moss and studded with low hills. In the northern and western parts it is covered with mountains belonging to the great Scandinavian chain. In the more southern latitudes the valleys between these mountains contain good arable and meadow land. The coasts are lined with precipices, reefs, and rocky islands, which render navigation very hazardous. The centre of Finland is an elevated plateau, from 400 to 600 feet above the sea, full of lakes, and covered with low rocky elevations, mostly composed of red granite. Besides Lake Ladoga [RUSSIA], the chief lakes of Finland are those of Saima and Enare. The rivers, none of which are large, are the Voxa, Kymmene, Kumoyoki, Yananus, Sestra, Tornea, Muonio, the Tana-elf, and some others.

Finland is very swampy, and is severely cold in winter; but the climate appears to be on the whole salubrious. There are extensive forests of firs and pines in the south, interspersed with oaks, elms, &c. In northern Lapland these trees are replaced by the birch, until, in the coldest districts, trees cease altogether. The mountains and hills are in general naked. The greater portion of the soil is either stony or sandy. The chief crops are barley, rye, oats, wheat, peas, beans, hemp, flax, potatoes, carrots, parsnips, onions, hops, and tobacco; but the produce is seldom large. Of fruit there is scarcely any. The forests yield much timber, pitch, and potash. The pasture lands are ill managed, and the cattle and horses are few in number. The horses of Finland are small, but strong and active. Fowl and other wild game are plentiful. Bears, elks, wolves, foxes, martens, &c., afford a large supply of furs and skins. Reindeer abound in all parts of northern Finland, and are of the utmost value to the inhabitants. The streams are well provided with fish, which form the chief food of the people. The mineral produce met with is chiefly bog-iron, lead, copper, marble, slate, and chalk.

The majority of the population is of Finnish extraction. [FINS.] They are all free, and many of them are landholders. A great number have leases of the crown, and hold their farms for life, with the privilege in some cases of bequeathing them to their children. Their dwellings, called Poertte, are low, dark, and unclean, and built of wood. Finland contains 26 towns, 1894 villages, and 28,735 'hemman,' hamlets, settlements, and homesteads. All the inhabitants, except the Russians, profess the Lutheran faith. There are—a university at Helsingfors, grammar-schools in Wiborg, Abo, and Borgo, and inferior schools in the majority of the parishes.

Agriculture, the breeding of cattle, and in some parts the fisheries constitute the principal occupations of the people. There are few manufactures except in the large towns, and these are principally of iron-ware, sail-cloth, and stockings. The navigation and trade are inconsiderable.

There is a distinct establishment at St. Petersburg for the government of this vast province or principality. The governor-general, who resides at Helsingfors, has chiefly military duties to discharge. There is a semblance, and little more, of a constitutional government. The province is divided into eight circles: Wiborg, St. Michael, Nyland, Tavastehus, Abo-Biörneborg, Wasa, Kuopio, and Uleaborg-Kayana. The chief towns are Wiborg, Frederikshamm, St. Michael, Nyslott, Helsingfors (the capital), Borgao, Lowisa, Tavastehus, AboBiörneborg, Raumo, Nystad, Wasa, Christianstädt, Kuopio, Uleaborg-Kuyana, Brahestad, Padasjärviz-Kousoma, Kenii, and Tornea. Abo has about 14,000 inhabitants, and Helsingfors about 11,000: none of the other towns have more than 5000.

(Rüh's *Finland;* Friccius; Meissner; Hassel; Cannabich, &c.)

FINLAND, GULF OF. [BALTIC SEA.]

FINMARK. [NORWAY.]

FINS, a people from whom the present inhabit-

ants of many of the most northern countries in Europe are descended, constitute a large proportion of the population of Eastern Russia, and of the countries adjacent to the gulfs of Finland and Bothnia and the Frozen Ocean. They are the *Fenni* of Tacitus, and the *Phinni* of Ptolemæus. Their present number is variously estimated: by some writers at 2,400,000, and by others at 3,000,000 and upwards. They are of Asiatic origin, and their dominion once extended from the sources of the Obi and the banks of the Volga to the shores of the Baltic, as far as the north-eastern parts of Prussia. The period of their migration westward is unknown. Being addicted to a wandering life, they could not contend against their more settled neighbours; and they gradually fell under the subjection of the Norwegians, the Russians, and the Swedes. They are divided into the Eastern Fins and Western Fins, and these again into numerous tribes. More than one-third of the whole number are inhabitants of Finland; the rest are scattered.

The Fins differ wholly from the Sclavonians and Livonians. They have an alphabet and language peculiar to themselves. The majority are attached to agricultural pursuits; some few tribes are nomadic; and some devote themselves exclusively to hunting and fishing. They are of middling stature, but of a strong, robust, make. Their characteristic features are a flat face with hollow cheeks, dark gray eyes, and light brownish hair, a thin beard, and sallow complexion. The Fins are a brave, honest, and hospitable race of men, but headstrong, frequently ferocious, and repulsive in their manners. Most of them are now Christians. They have no nobility. The peasant however always gives precedence to the citizen or merchant, and holds every servant of the crown in high respect.

FIORILLO, JOHANN DOMINIK, a German painter and author, was born at Hamburg in 1748. He went to Rome in 1761, and was for four years the pupil of Pompeo Batoni; he studied also some time at Bologna, where he was elected a member of the academy in 1769. In 1784 he was appointed to the professorship of art in the university of Göttingen, where he died in 1821. He is the author of several essays relative to the history of modern art, but his great work is his history of painting, comprising the 'Geschichte der Mahlerey' (History of Painting) in Italy, France, Spain, and England, in five volumes, and the 'Geschichte der Zeichnenden Künste in Deutschland und den Vereinigten Niederlanden' (History of the Arts of Design in Germany and the United Netherlands), in four volumes 8vo.

FIR. [ABIES; PINUS.]

FIRDUSI, ABUL CASIM MANSUR, a celebrated Persian poet, was born at the village of Shadab, in the district of Tus, in the province of Khorassan, about A.D. 931.

Firdusi appears to have spent the first fifty years of his life in his native village, till, attracted by the encouragement which Mahmud gave to learning and the fine arts, he repaired to his court at Ghaznî. Mahmud commanded him to write a history of the kings of Persia in verse, and promised to reward him with a thousand pieces of gold for every thousand couplets. The poet however preferred waiting for his reward till he had finished the work, which was completed, after a labour of thirty years, in 60,000 couplets. But, instead of the great sum he had anticipated, Mahmud only sent him 60,000 silver dirhems. Firdusi was in the bath when the money was brought, and, enraged at the meanness of the sultan, he distributed the whole sum among the attendants of the bath and the slave who brought it, adding, 'The sultan shall know I did not bestow the labour of thirty years on a work to be rewarded with dirhems.' In consequence of this insult, he was sentenced to be trod to death by an elephant, and with great difficulty obtained a revocation of the sentence. Feeling that he was no longer safe at Ghaznî, he left the city, after having written a bitter satire on Mahmud, which he gave to one of the courtiers, telling him that it was a panegyric on the sultan which he must not present to his master till several days had elapsed. A translation of this satire is given by Sir William Jones, accompanied with the original Persian, in in his 'Poëseos Asiaticæ Commentarii' (Works, 8vo. edition, vol. vi. pp. 308 313), and also without the Persian, in his 'Traité sur la Poësie Orientale,' vol. xii. pp. 242-245.

The accounts given in the Persian biographies of Firdusi after his departure from Ghaznî are vague and unsatisfactory. The remainder of his life was spent in wandering from one kingdom to another, pursued by the emissaries of Mahmud, whose power was too much dreaded by the various monarchs of the East to allow them to harbour for any length of time the proscribed poet. He returned to his native town, where he died A.H. 411 (A.D. 1020), in the 89th year of his age.

The 'Shah Nameh' contains the history of the kings of Persia from the reign of the first king, Kaiûmers, to the death of Yesdijird, the last monarch of the Sassanian race, who was deprived of his kingdom A.H. 21 (A.D. 641) by the invasion of the Arabs during the caliphate of Omar. During this period, according to Firdusi, three dynasties sat upon the Persian throne. The first, called the Pishdadian, lasted 2441 years. The second, the Kaianian, commenced with Kaikobad, and lasted 732 years. Alexander the Great, called Sikander by Firdusi, is included in this race, and is represented to be the son of Dârâb, king of Persia, by the daughter of Failakus (Philip of Macedon). After the death of Sikander, Persia was divided, during 200 years, into a number of petty monarchies called the 'confederacy of the kings.' The Sassanian race of princes succeeded these, and ruled over the whole of Persia for 501 years.

The only value of the 'Shah Nameh,' in an historical point of view, consists in the ancient Persian traditions which it has preserved. But as a poem it is read and admired by all well-educated Persians even in the present day; and the author may be considered as the greatest of oriental poets, with the exception of Valmîkî and Câlidâsa. It is written in purer Persian than any other work in the language, and contains a very small number

of Arabic words; it has thus become a model of Persian composition, and is as much distinguished in the East as the Homeric poems were in the West.

The copies of the 'Shah Nameh' now met with vary greatly in the number of verses. 'It would be difficult to discover,' says Mr. Macan in his preface to the 'Shah Nameh,' 'two copies which agree in the order of the verses or in the phraseology for 20 couplets together. Whole episodes are omitted, verses rejected from every page, and it is not now uncommon to find MSS. which contain only 40,000 couplets, though originally the poem is said to have consisted of 60,000.' Mr. Macan adds, that he had never seen a MS. with more than 56,685 couplets; the edition published by himself contains only 55,204. The whole of the 'Shah Nameh' was published by Mr. Turner Macan, at Calcutta, 1829, in 4 vols. 8vo.; this edition was printed at the expense of Nuseer-ood-een-Hyder, one of the native princes of Hindustan.

There is also an abridgment of the 'Shah Nameh' in English in prose and verse by Mr. James Atkinson, London, 8vo., 1833. The entire poem was translated into Arabic prose, A.H. 675 (A.D. 1277), by Caouâm-êddyn-Abul-Feteh-Isa, a native of Ispahan. A small portion of it was published by Wahl in the original Persian with a German translation and many valuable notes in the 5th volume of the 'Fundgruben des Orients,' Wien, 1816 (pp. 109–131, 233–264, 351–389). The first eight books were translated by Champion in one volume 4to., 1784; and a few extracts were also translated into English verse by Stephen Weston, B. D., Lond., 1815. Farther particulars of the life of Firdusi will be found in Silvestre de Sacy's translation of his life by Daulet Shah, published in the 4th volume of *Notices et Extraits des Manuscrits*, pp. 202–238.

FIRE-ARMS. [ARMS; ARTILLERY.]

FIRE-BOTE. [ESTOVERS.]

FIRE-BRIGADE. Down to the year 1825 all the Fire Insurance Companies of London had their separate establishments of fire-engines; but in that year the Sun, the Union, and the Royal Exchange Companies joined their fire-engine establishments, which were placed under one superintendence. Soon afterwards the Atlas and the Phœnix Companies joined the association. The advantage of this combined system of action having been proved, most of the remaining companies joined in 1833, and formed a new association which was to be managed by a committee, formed of one member from each of the associated companies. London was divided into a certain number of districts, in each of which were two or more stations, provided with engines.

The plan has worked well: more companies have joined the association; and it is found that all are benefited. The firemen are formed into a corps, called the fire-brigade, which is under the control of Mr. Braidwood, superintendent of the establishment. The men are clothed in a uniform; and a certain number of them at each station are ready at all hours of day or night. Each company pays its quota towards the expenses of the fire-engine establishment.

FIRE-COCK. [ARMS.]

FIRE-ENGINE. In Rome under the emperors there were bands of trained firemen kept. (Sueton., 'August.' c. 30, and the note in Burmann's ed.) Ctesibius is believed to have invented some engine for the extinction of fires in the time of the Ptolemies; and a few indications of similar inventions are met with in other quarters. But the first fire-engine which has been distinctly described was made by Hautsch of Nürnberg about 1657. Duperrier received a patent for making fire-engines for France in 1699. None of these earlier engines had either a flexible hose or an air-chamber: the first of these was introduced by Jan Vanderheide in 1672; and the latter by Leupold in 1720. It was about the beginning of the same century that fire-engines came generally into use in England.

A fire-engine of the common construction consists of an oblong wooden chest or cistern, along the lower part of which runs a metallic pipe, into which the water flows from a feed-pipe connected at the other end with the street plug. The water having entered the interior pipe is elevated and forced into an upright air vessel by two pumps which are worked by manual power, by means of long handles or levers on the outside. From the air-vessel the water is forced into a pipe connected with the leather hose; and from the latter it is forcibly impelled on the burning buildings. If there were no air-vessel the water would not flow out in an equable continuous stream, but would gush forth at intervals at every successive movement of the pump handles; but by the aid of the air-vessel the stream is rendered continuous by the elastic pressure of air within the vessel.

Numerous improvements have been introduced in almost every part of the fire-engine, whereby it has been rendered much more efficient than formerly. In 1830 Mr. Braithwaite introduced an ingeniously constructed steam fire-engine, which has occasionally been employed. The same engineer has also introduced a steam floating fire-engine, in which the power of the engine can be transferred for propelling the vessel to working the pumps when requisite.

FIRE-ESCAPE. Numerous contrivances have been brought before public notice from time to time for saving the lives of persons who may be in a building while it is burning. Mr. Maseres devised a kind of chair of straps, by which a person could lower himself from the window. Mr. Davis proposed the use of three ladders, which might draw out like a telescope, and might reach from the ground to the upper windows of a house. Mr. Young contrived a sort of rope-ladder, with iron rounds, of very flexible construction. Mr. Braby invented a sort of a long pole, down which a car or chair might travel from a window to the ground. Mr. Witly introduced a sort of bag or case, which may be lowered from the sill of a window by ropes governed by the person who might be seated in the bag. Mr. Ford recommended the use of a long pole, at the upper end of which is tackle for lowering persons from a window. Mr. Merryweather has contrived a series of short ladders, which fit on to each other end to end, and can be elevated to a considerable height quickly.

But the fire-escape which has come most into use in London is a wheel-carriage supporting a lofty canvas shoot or trunk, attached to a ladder or frame; when placed up against a house, a person can get into this trunk from a window, and slide safely down to the bottom, with the aid of some ingenious mechanism attached to the frame. Many such machines are kept in public places in London during the night, attended by men whose business it is to wheel these machines to any spot where life is endangered by fire.

FIRE-FLY. [ELATERIDÆ; LAMPYRIDÆ.]

FIRE, GREEK, an invention of the middle ages which was often employed in the wars of the Christians and Saracens. According to Gibbon, this combustible was used at the sieges of Constantinople in the 7th and 8th centuries. It was afterwards employed by the caliphs against the Crusaders; but the invention of gunpowder changed the nature of military tactics. There is much uncertainty as to the nature of this Greek Fire. It is supposed to have been a compound of naphtha, sulphur, and pitch; and Gibbon thus describes its effects:—'From this mixture, which produced a thick smoke and a loud explosion, proceeded a fierce and obstinate flame, which not only rose in perpendicular ascent, but likewise burnt with equal vehemence in descent or lateral progress; instead of being extinguished, it was nourished and quickened by the element of water; and sand, urine, or vinegar, were the only remedies that could damp the fury of this powerful agent, which was justly denominated by the Greeks the Liquid or the Maritime Fire. For the annoyance of the enemy, it was employed with equal effect by sea and by land, in battles or in sieges. It was either poured from the ramparts in large boilers, or launched in red-hot balls of stone and iron, or darted in arrows and javelins, twisted round with flax and tow which had deeply imbibed the inflammable oil: sometimes it was deposited in fire-ships, the victims and instruments of a more ample revenge, and was most commonly blown through long tubes of copper, planted on the prow of a galley, and fancifully shaped into the mouths of savage monsters, that seemed to vomit a stream of liquid and consuming fire.'

FIRE-PROOF BUILDINGS. The most obvious method of rendering houses and other buildings indestructible by fire is to construct them entirely of incombustible materials, such as stone, brick, and iron. Such a mode of construction, however, is of very limited application. The use of iron, and especially of cast iron, in buildings, has indeed increased very much, and many plans for the construction of dwelling-houses almost entirely of that material have been brought forward.

Brickwork forms in this country the chief material of the external walls of houses, and it is occasionally employed without any admixture of timber for the partition walls also,—a plan which, in conjunction with other precautions, tends greatly to limit the damage done by a fire to the apartment in which it may happen to break out. Cast-iron pillars and brest-summers are very extensively employed in modern London shops and warehouses, where the whole front on the ground floor is left open for shop-windows and doors. Fire-proof floors are now often adopted, not only in public buildings, but also in the larger and better sort of private houses; the beams being either of cast or wrought iron, and the brick vaultings, which abut upon the ledges of the beams, being often only half a brick thick. In Farrow's patent method of fire-proof building, the floors are supported upon joists of wrought iron, formed with a projecting flange on each side, upon which are laid, stretching from joist to joist, a series of flat stones, the upper surfaces of which lie flush with the upper edges of the joists. These produce a level stone floor, interlined with iron, which may either be used as such or be covered with planks. Mr. Frost has invented a mode of constructing floors and roofs of hollow square earthenware tubes, laid in strata crossing each other in direction, and united with cement in such a way that the whole floor becomes one solid flag-stone. In one mode of construction, hollow earthen pots are employed to form a sort of vaulted roof.

The great use of timber in building renders very important any method by which it may be rendered incombustible. Solutions of muriate of ammonia, muriate of soda, sal-ammoniac, borax, alum, and several other salts and alkalies, with which wood may be impregnated, or which may be applied to its surface, possess this quality in a limited degree; and by Payne's wood-preserving process timber is made, for all practical purposes, completely incombustible. The non-conducting power of earth and sand, or of a layer of sand placed over timber, has been the basis of many plans for preventing fires.

FIRE-SHIP is a vessel laden with combustible materials, which is sent or left in a burning state among the ships of a hostile fleet for the purpose of setting them on fire. Such vessels have been used in various countries, at different times. Those now constructed have between decks, on both sides, a stage containing a groove, in which the train of powder for firing the combustibles is deposited in a hose or tube. The stage is covered with a tarpaulin on which is strewed loose powder; and on this are placed faggots of wood and bundles of hemp steeped in a mixture of resin, turpentine, saltpetre, and mealed gunpowder, billets of wood dipped in saltpetre and pitch, casks filled with chips of wood mixed with pitch and turpentine, and loaded shells and carcasses. Faggots soaked in pitch are also fastened to the sides of the ship; and around the ship are grappling-irons to enable it to cling to the ill-fated vessel to be destroyed. When the crew have brought the fire-ship close to its prey, they fire the combustibles, and escape by a boat as quickly as possible.

FIRENZE. [FLORENCE.]

FIRENZUO'LA, A'GNOLO, was born September 28, 1493, in Florence. He lived in his native city devoted to the study of elegant literature till the age of sixteen, when he went to Siena, where he studied law with much labour but little satisfaction to himself; he also studied at Perugia, and practised for a short time as an advocate at Rome. While yet a young man, he left the

law for the church, assumed the habit of the monks of Vallombrosa, and in the year 1525 was elected abbot of the monastery of Santa Maria Ermita, at Spoleto. He was afterwards appointed abbot of San Salvatore, at Prato, where he chiefly resided during the rest of his short life. The year of his death is not known, but it was probably about 1542 or 1543.

His works were published in 1548. They consist of 'Discorsi degli Animali;' 'Ragionamenti;' 'Novelle;' 'Epistola in Lode delle Donne;' 'Dialogo delle Bellezze delle Donne;' 'Discacciamento delle Nuove Lettere;' two comedies, 'I Lucidi' and 'La Trinuzia;' 'Asino d'Oro d'Apulejo rifatto in Lingua Fiorentina,' and 'Rime.'

Firenzuola is entitled to a high place among the early Italian writers, particularly for the purity and elegance of his style. His works have been frequently reprinted, both separately and collectively, and are still much read.

FIRESTONE, a local term for the upper greensand, as it occurs along the edges of the chalk hills south of London, as at Merstham and Petersfield. (Fitton, 'On Greensand,' in *Geological Trans.*)

FIRKIN, a measure of ale, beer, and some dry commodities, now disused. Eight gallons of ale, soap, or herrings, made a firkin, and nine gallons of beer made a firkin.

FIRM. [PARTNERSHIP.]

FIRMA'N, or FIRMAU'N, is the name of the decrees issued by the Turkish sultan, which are signed with his own cipher or signet. Firmaun is also the name of a kind of passport which the pashas are in the habit of granting to travellers, especially Europeans, by which they enjoin the subordinate authorities to give the bearer protection and assistance.

FIRST-FRUITS (*Primitiæ*), the profits of every spiritual living for one year, according to the valuation thereof in the king's books. They were claimed by the pope throughout Christendom; in England this claim was first asserted in the reign of King John, and then only so far as related to clerks whom he appointed to benefices. Afterwards Pope Clement V. and John XXII., about the beginning of the fourteenth century, demanded and took them from all clerks, by whomsoever presented. By the Statutes 25 Henry VIII. c. 20, and 26 Henry VIII. c. 3, first-fruits and tenths [TENTHS] were taken from the pope and given to the king. In the thirty-second year of the same king's reign a court was erected for the management of them, but it was soon after abolished. Ultimately Queen Anne gave up this branch of the royal revenue to be applied towards the augmentation of small livings. [BENEFICE.]

First-fruits arising in Ireland were, by the 2 Geo. I. c. 15, directed to be applied for the same purpose; but, by the 3 & 4 William IV. c. 37, the payment of first-fruits in Ireland was abolished.

FISC, FISCUS, means a basket of wicker-work, such as would hold a sum of coined money. Under the Roman empire it was used to signify the treasury of the emperor as distinguished from that of the state; and it has received the same meaning in some modern states. The fiscus was chiefly replenished by fines and unclaimed property of deceased persons: the taxes and other revenues were paid into the *ærarium*. Under absolute monarchies however the two treasuries have been often confounded both in name and in reality. Under the feudal system, *fiscus regius* and *fiscales terræ* signified the domains of the crown, and the peasants attached to those domains were called *fiscalini*. Fiscus by degrees came to be used figuratively for the rights of the crown in civil as well as criminal matters, and the king's attorney was called *procurator fisci, procureur fiscal* in French, *avocato fiscale* in Italian.

FISCHER, KARL VON, founder of the Munich school of architecture, was born at Mannheim, September 19, 1782. He was placed by his father under Verschaffelt, an architect of ability, whom he accompanied to Vienna, where he studied at the Academy from 1801 to 1806. It was while he was at Vienna that he first projected what afterwards became his greatest work, the new 'Hof Theater' at Munich. Fischer visited France first, and afterwards Italy, diligently studying all the most remarkable examples of architecture. On his return to Germany in 1809, he went to Munich, where he was made Professor of Architecture at the Academy, of which office he continued, up to the time of his death, to discharge the duties with equal zeal and ability.

One of the first buildings erected by him at Munich was the mansion at the entrance to the 'English Garden,' called the 'Pavillon Royal.' Many other buildings were erected by him, but these were only minor works in comparison with the 'Hof Theater,' which is still one of the principal ornaments of Munich, though numerous other stately edifices have been since added to the city. This magnificent theatre was begun in 1811, and first opened Oct. 12, 1818, but was nearly consumed by fire in 1823: it was however rebuilt according to the original designs. Fischer did not live to learn the fate of the structure, as he died Feb. 11, 1820.

FISH (German, *Fisch;* French, *Poisson*), a name applied to all the species of a class of animals occupying the lowest station of the four great divisions of the section vertebrata.

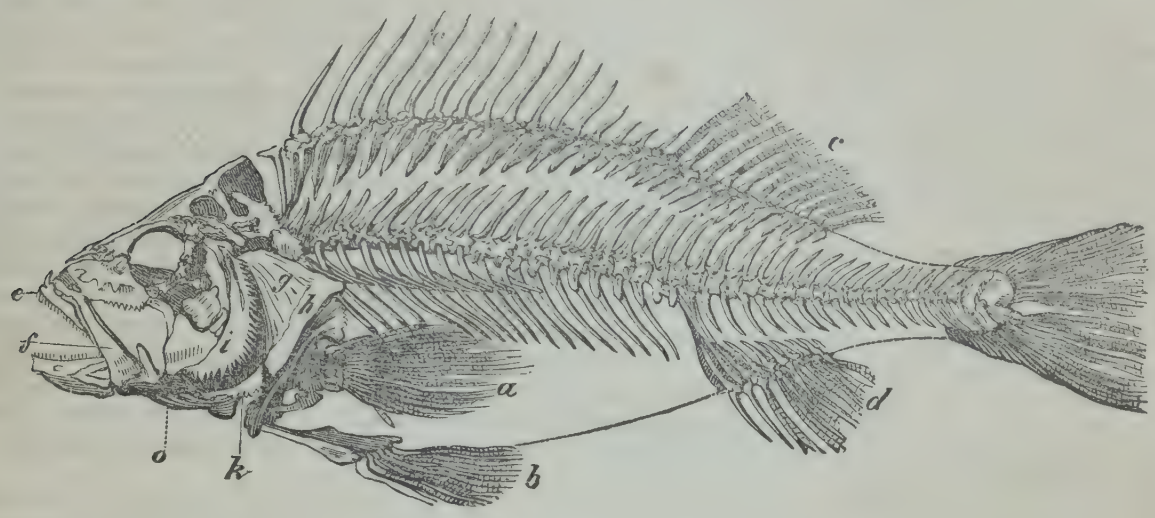
A fish may be defined as a vertebrate animal, breathing through the medium of water by means of branchiæ, or gills, having one auricle and one ventricle to the heart, cold red blood, and extremities formed for swimming.

In considering fishes, perhaps the most important thing which offers itself to our attention is the apparatus called the branchiæ, or gills. This apparatus is situated on each side of the neck, and consists of numerous laminæ fixed on arches. These laminæ are covered with innumerable blood-vessels, and are so constructed as to present a considerable surface to the water, so that the blood may receive a sufficient portion of the oxygen contained in that element. As the water in contact with the gills becomes deteriorated, it is necessary that a constant current be caused to flow over them. In most fishes this is effected by their taking the water in at the mouth and ex-

pelling it from under the gill-covers. The blood, which is constantly sent to the branchiæ from the heart, is distributed by means of the arteries to every part of the body, whence it returns to the heart by means of the veins.

As the breathing apparatus in the fish is suited to aquatic habits, so likewise is every part of its structure. The body is generally of an elongate-oval compressed form, covered with scales directed backwards, and furnished with fins: thus being beautifully adapted for swimming. Many fishes moreover have a bladder filled with air situated

immediately beneath the spine, by the dilatation or compression of which their specific gravity is said to be varied. The thoracic part of the body is thrown forwards towards the head (so that fishes may be said to have no neck), and thus the hinder part of the body is more free and fitted for motion. The limbs are formed into fins, the fore-legs constituting what is termed the *pectoral fins*, and the posterior extremities the *ventral fins*. Besides these fins, ordinary fishes are furnished with one or two *dorsal fins*, an *anal fin*, and a *caudal fin*, or tail.



Skeleton of the Common Perch.
a, the pectoral fin; *b*, the ventral fin; *c c*, the dorsal fins; *d*, the anal fin; *e*, the intermaxillary bone; *f*, the maxillary bone; *g*, the operculum: *h*, the sub-operculum; *i*, the pre-operculum; *k*, the inter-operculum.

All these fins are not always present, nor when present are they always in the same relative positions; and we shall hereafter find that both the absence of certain fins, and the peculiar position of these organs, afford characters in the classification of fishes. The fins consist of a thin elastic membrane supported by rays. The rays are of two kinds. Those which consist of a single bony piece, usually hard and pointed, are termed *spinous rays*; and those in which the rays are formed of numerous portions of bone united by articulations, and frequently divided longitudinally into several filaments, called *flexible rays*. The principal organ of motion is the tail; the dorsal and ventral fins apparently serve to balance the fish, and the pectorals to arrest its progress when required.

The bones of fishes are of a less dense and compact nature than in the higher order of animals, and always remain in an isolated state, similar to that of the embryo of the mammalia. The skeleton may be divided into four chief parts—the vertebral column, the head, the respiratory apparatus, and the limbs. The vertebral column consists of vertebræ which are concave at each end and pierced in the middle; and when joined together the hollow space between each two is occupied by a gelatinous substance, which passes from one space to the next through the hole in each bone. This hole is usually very small, but in some of the Chondropterygians it is so large that the bodies of the vertebræ are mere rings. To the vertebræ are attached the ribs; in fact, the ribs are the main support of all the other bones. The head varies more in form than in any other class of vertebrate animals. The same bones as those found in other oviparous animals are almost always traceable. We shall confine our observations to those which are most frequently referred to in technical descriptions.

The upper jaw consists of maxillary and intermaxillary bones. In the greater number of fishes the intermaxillary bones constitute the chief portion of the upper jaw, the maxillary bones being placed behind and parallel to them and articulated to the vomer. In the salmon tribe, and some other fishes, however, the intermaxillary bones are smaller in proportion, and form a continuous line with the fore part of the maxillary bones. In the Chondropterygians the maxillary and intermaxillary bones are reduced to mere rudiments, their functions being performed by the bones analogous to the palatines, and sometimes by the vomer.

The *lower jaw* is generally composed of at least two bones on each side, the dental portion in front, and the articular portion behind.

The *palatines* are extended longitudinally on each side, and form part of the roof of the mouth; they are often furnished with teeth.

The *opercular bones* form the chief portion of the sides of the head behind the eye: these are generally four in number, and are termed the *operculum*, the *sub-operculum*, the *pre-operculum*, and the *inter-operculum*. The first of these covers the gills.

The *branchiostegous rays*, which are often mentioned in descriptions, are situated under the opercular bones.

The *teeth* in fishes are almost entirely osseous; they are usually of a simple spine-like form, and recurved at the tip. Teeth are found in almost every bone in the interior of the mouth; in the superior and inferior maxillary, and intermaxillary bones; likewise on the branchial arches, pharangeal bones (which are situated in the throat), and on the tongue. There is considerable variety in their structure.

The *scales* are composed of two substances, one resembling horn in its texture, and the other of a harder and bone-like nature; they are generally attached to the skin by their anterior edge, and consist of numerous concentric laminæ (secreted by the skin), the smallest of which is first formed. Certain scales, forming a continuous series, in a slightly waved line from the head to the tail of the fish, are pierced in or near their centre, and furnished with a tube through which a slimy matter is poured, which serves to lubricate the body of the animal. This series of tubes forms a line visible on the sides of the body, and which is termed the *lateral line*.

The structure, form, and position of the scales of fishes are very variable, and have furnished M. Agassiz ('Recherches sur les Poissons Fossiles') with characters for a new classification of these animals.

As regards the senses, those of taste and touch appear to be but slightly developed in fishes. When we find the tongue thickly covered with teeth (as is often the case), and used as an organ of prehension, and when we consider the quick manner in which the food is swallowed, it would certainly appear that their sense of taste is very slight. The sense of touch is probably most developed in the cirrhi attached to the mouth of those fishes that have them. The long filaments with which the fins of some fishes are furnished also perhaps serve, through the sense of touch, to indicate the vicinity of weeds, or other objects in the water.

The eyes are differently placed in the various species of fishes, in accordance with their habits: for the most part they are placed laterally, and in some (those that live at the bottom of the water) we find them directed upwards. In some of the species of sharks (those of the genus *Zygenæ*) they are situated at the end of an elongated lateral process on each side of the head.

The sight in fishes is acute; the range of vision however is somewhat limited. The eyes (which are furnished with a spherical lens) are generally large; but in some species they are very small, whilst others appear to be destitute of them.

Although fishes appear not to possess certain portions of the auditory apparatus, observed in animals of a higher grade, they nevertheless possess the sense of hearing.

There are reasons for the belief that the sense of smell in fishes is tolerably acute: their olfactory nerves are of large size, and disposed over a considerable extent of surface.

By far the greater number of fishes are of carnivorous habits; there are some however which feed upon vegetable substances, and we find the stomach modified accordingly as in other animals.

The sexes of fishes, if we except the shark and rays, offer no very decided external characters by which they may be distinguished. As in the higher animals, however, observes Mr. Yarrell, 'the respiratory organs occupy more space in the males than in the females; and, on the other hand, the abdomen is larger in the females than in the males: the males may therefore be known from the females by their somewhat sharper or more pointed head, the greater length of the gill cover, and the body from the dorsal fin downwards being not so deep compared with the whole length of the fish.'

Fishes are divided by Cuvier into two series, that of ordinary fishes, or *Ossei**, distinguished by having the skeleton bony; the osseous matter being disposed in fibres; the sutures of the cranium distinct; maxillary and intermaxillary bones, either one or both present: and that of the *Cartilaginei* or *Chondropterygii*, distinguished by having the skeleton cartilaginous; the bones destitute of fibres; sutures of the cranium indistinct; maxillary and intermaxillary bones either wanting or rudimentary, their place being supplied by the palatine or vomer.

These two series are subdivided as follows:—

SERIES 1. Ossei.

Section 1. Pectinibranchii.

Order 1. Acanthopterygii.

Family Percidæ	Family Theutyes
Loricati	Pharyngiens labyrinthiformes
Sciænidæ	Mugalidæ
Sparidæ	Gobiadæ
Mænidæ	Lophiadæ
Squamipinnati	Labridæ
Scombridæ	Centriscidæ.
Tænioidæ	

Order 2. Malacopterygii.

1. Abdominales.	2. Subbrachiales.
Family Cyprinidæ	Family Gadidæ
Esocidæ	Pleuronectidæ
Siluridæ	Discoboli
Salmonidæ	Echeneididæ.
Clupeidæ	

Order 3. Apodes.

Muræniдæ.

Section 2. Plectognathi.

Gymnodontidæ.

Sclerodermi.

Section 3. Lophobranchii.

Syngnathidæ.

SERIES 2. Cartilaginei, or Chondropterygii.

Order 1. Eleutheropomi.

Sturionidæ.

Chimæridæ.

Order 2. Plagiostomi.

Squalidæ.

Raiidæ.

Order 3. Cyclostomi.

Pteromyzidæ.

* Cuvier gave no name to this section. The one here used is that given by Mr. Jenyns. Other sectional names have also been taken from the same author.

FISH-HAWK. [Bald Buzzard.]

FISH-LICE. [Caligus.]

FISHER, JOHN, bishop of Rochester, was born at Beverley in 1456, and educated at the collegiate school of his native place. He thence removed to Michael House College, Cambridge, of which he became master in 1495. Margaret, countess of Richmond, Henry VII.'s mother, appointed him her chaplain and confessor. He was named the first 'Lady Margaret's Professor of Divinity' in the University of Cambridge, and became bishop of Rochester in 1504. In 1527 Fisher was the only bishop who refused his signature to the declaration that the marriage of Henry VIII. with Catherine was unlawful. In 1534 Fisher again stood alone on the question of the pope's supremacy. These opinions created much ill feeling against him among the partisans of Henry, and on the exposure of the imposture of Elizabeth Barton, the nun of Kent, it was deemed fit that those who had been privy to the deception should not escape unpunished. Among these was Fisher, who, knowing this woman and her associates to be impostors, disgraced himself by not exposing the imposition. He made many vain excuses, but was found guilty of misprision of treason. He was not proceeded against upon this charge for some time; but on his continued denial of the king's supremacy, on the 17th of June, 1535, he was called to account for this offence. The Lord Chancellor, the Duke of Suffolk, and some other lords, together with the judges, were appointed commissioners for his trial. He was found guilty, and condemned to die as a traitor. On June 22 he was beheaded.

FISHERIES are localities frequented at certain seasons by great numbers of fish, where they are taken upon a large scale. Of the British fisheries, some are carried on in rivers or their æstuaries, and others in the bays or along the coasts. Our principal cod fishery is on the banks of Newfoundland; and for whales our ships frequent the shores of Greenland, Davis's Straits, and the South Seas. Of late, whale fisheries have also been carried on near the shores of Australia, New Zealand, and the Cape of Good Hope.

In the reign of Queen Elizabeth and afterwards, various associations were formed and orders in council issued, having for object the encouragement of British fisheries; but the trade did not flourish under these protections. Every attempt to encourage the fisheries by means of bounties failed, and the impolicy of granting these bounties was at length seen and acknowledged. In 1821 the tonnage bounty of 60*s.* per ton on fishing vessels was repealed; the bounty of 4*s.* per barrel, which was paid up to the 5th of April, 1826, was thereafter reduced 1*s.* per barrel each succeeding year; so that, in April 1830, the bounty ceased altogether. This alteration of the system was not productive of any serious evil to the herring fishery.

In the year ending January 5, 1846, the number of barrels of white herrings cured in Great Britain was 532,646; and the number of barrels exported, 242,194. Of the herrings exported from England and Scotland rather more than half were sent to Ireland. Of cod, ling, and flake, about 100,000 cwts. were cured and dried in that year, and about 6000 barrels were cured in pickle. The aggregate number of all these fish was about three millions. The number of boats employed in the herring, cod, and ling fisheries was 14,649; and the number of persons (crew, coopers, gutters, cleaners, curers, packers, &c.) was 100,595.

The removal of the bounty has been attended with an improvement in the condition of the fishermen generally, and in Scotland the fishermen have been able, from the fair profits of their business, to replace the small boats they formerly used by new boats of larger dimensions, and to provide themselves with fishing materials of superior value.

The facilities of communication with populous inland districts have greatly extended the market for fish, and the rapid means of transport by railways enables the inhabitants of Birmingham and London to consume cod and other fish caught in the Atlantic by the fishermen of Galway and Donegal. The fishermen who supply the London market, instead of returning to Gravesend or other ports of the Thames and Medway, put their cargoes, already packed in hampers, on board the steam-boats which pass along the whole eastern coast as far north as Aberdeen; or they sometimes make for Hull or some other port in the neighbourhood of the fishing-ground, and there land their cargoes, which are conveyed rapidly inland per railway. Fast-sailing cutters are sometimes employed to take provisions to the boats on the fishing-ground, and to bring back the fish taken by each.

One branch of fishing wholly different in its object from all other branches is the *Stow-Boat Fishery*. This fishery prevails principally upon the Kentish, Norfolk, and Essex coasts; and the object is the catching of sprats as manure for the land, for which there is a constant demand. This branch of fishing gives employment on the Kentish coast alone to from 400 to 500 boats.

Vessels and boats employed in fishing are licensed by the Commissioners of Customs; and they are required to be painted or tarred entirely black, except the name and place to which such vessel or boat belongs. The licenses thus granted specify the limits beyond which fishing vessels must not be employed: this distance is usually four leagues from the English coast.

The *Pilchard Fishery*, which is carried on upon parts of the Devon and Cornish coasts, employs about 1000 boats, 3500 men at sea, and about 5000 men and women on shore. As soon as caught the pilchards are salted or pickled and exported to foreign markets, chiefly to the Mediterranean: the average exports amounts to 30,000 hogsheads per year.

Our chief *Salmon Fisheries* are carried on in the rivers and æstuaries of Scotland, but the annual value of this fishery is not exactly known. The produce of the fishings in the rivers Tay, Dee, Don, Spey, Findhorn, Beauly, Borriedale, Langwell, and Thurso, and of the coasts adjacent, are conveyed in steam-boats and small sailing-vessels to Aberdeen, where they are packed with ice in boxes and sent to the London market. London

is the great market to which Scotch salmon are sent. The quantity which arrives during one season is about 2500 tons, and the average price is from 10*d.* to 1*s.* per lb.

Mackerel visit every part of our coasts in the spring and early part of the summer, and are taken in great abundance. As mackerel will not keep, it may be hawked about on Sunday for sale.

The fisheries of Ireland, by the Act 5 & 6 Victoria, c. 106, have been placed under the regulation of the Board of Public Works, the commissioners of which prepare an annual report concerning them. In 1845 the commissioners registered 19,883 vessels and boats, and 93,073 men and boys, as engaged in the Irish fisheries. The whole coast of Ireland is divided into 28 fishing districts.

The *Cod Fishery* at Newfoundland was carried on as early as 1500 by the Portuguese, Biscayans, and French, but it was not until 1585 that the English ventured to interfere with them. The French and English have still continued to fish there. The principal fisheries of Newfoundland are prosecuted on the banks which nearly surround that island: the object of these fisheries is solely cod-fish. These fisheries may be said to be the sole pursuit of the settlers in Newfoundland, and of the traders who frequent the island.

In 1818 a convention was concluded between the United States' government and that of Great Britain for regulating the fisheries on the coasts of the British American provinces. Conventions are also in force relating to the British and French fisheries in the English Channel.

The *Whale Fishery* was carried on in the Bay of Biscay six or seven centuries ago, but was superseded by the Greenland and Spitzbergen fisheries in the 16th and 17th centuries. At first the whales were so numerous that the fishing was comparatively easy, and was very successfully pursued. It was then the practice to boil the blubber on the spot, and bring home the oil in casks. In the progress of the fishery the whales became less numerous, and, when found, more difficult to take. It therefore became necessary to pursue them farther to the open sea, and at length it was found more economical to bring the blubber home in order to its being boiled. The whale fishery was sustained by bounties from the year 1732 to 1824. The northern whale fisheries are now chiefly in Davis's Straits.

Previous to the revolt of the North American provinces this fishery, as well as that in the Southern Ocean, was prosecuted with great spirit by the colonists of Massachusetts.

It was not until after the breaking out of the war between England and the American provinces that England embarked in the southern fishery. In 1791 the number of English vessels so employed was 75; 1819 to 1823, above 100; and from 1830 to 1833 the number varied from 104 to 110. The number of ships which left Great Britain for the northern whale fishery in 1845 was 45, of which 19 were from Aberdeen and 14 from Hull. The aggregate tonnage was 11,586 tons. The produce was 4342 tons of train oil and blubber. In 1844 the number of ships which left London for the southern whale fishery was 13 (4004 tons). The produce from that fishery, which reached England in 1845, was 217 tons of train oil and blubber, and 1317 tons of spermaceti oil.

It requires a considerable sum of money to fit out a ship in England for the southern whale fishery. A new vessel of the size usually employed (350 tons) costs, when ready for sea and fully provisioned, from 12,000*l.* to 15,000*l.*; and the adventurer must wait three years for the return of his capital.

The whale fishery of the United States of North America is now greater than that of all other nations. Even on the coasts of our own colonies in Australia and New Zealand, the American whalers outnumber those of the English.

The Chinese belonging to Hainan and the neighbouring islands pursue the whale-fishery with considerable success near their own coasts.

FISHES. [Ichthyology.]

FISHES, FOSSIL. For the successful investigation of the numerous specimens of fishes, generally imperfect and difficult of interpretation, which occur in the various stratified rocks, we are almost wholly indebted to one naturalist. It is to M. Agassiz, following in the footsteps of Cuvier, that we owe the remarkable progress which has been made in this branch of Palæontology. He divides the fossil fishes into *Placoid*, *Ganoid*, *Ctenoid*, and *Cycloid*, and the formations in which they occur into *Cainozoic*, *Mesozoic*, and *Palæozoic*,* each of these formations having upper, middle, and lower subdivisions. We cannot here attempt to follow out his system, through orders, families, and genera, according to their distribution in different strata, but must content ourselves with the following primary table. Those who wish to enter into the study of fossil fishes will do well to consult the Reports of M. Agassiz to the British Institution for the years 1843, 1844, and subsequently.

General Distribution of the Orders of Fossil Fishes.

	Placoid.	Ganoid.	Ctenoid.	Cycloid.
Cainozoic Strata . .	*	*	*	*
Mesozoic Strata . .	*	*	*	*
Palæozoic Strata . .	*	*		

Hence it appears that the two orders of *Ctenoid* and *Cycloid* fishes, which are the most abundant in existing nature, have no representatives yet discovered in the Palæozoic strata.

FISHGUARD. [Pembrokeshire.]

FISSIROSTRES, the Swallow Tribe of birds, distinguished by a very broad bill with a very wide gape, and small and feeble feet. They belong to the order *Insessores*, or *Perchers*, and take their food on the wing. [Insessores; Night-Jars; Swallows.]

* Καινός, new; — Ζωή, life; — Μέσος, middle; — Παλαιός, ancient.

FISTULA'RIA, a genus of acanthopterygious fishes, remarkable for the extreme elongation of the anterior part of the head, forming a tube, at the extremity of which is the mouth. The *Fistularia tabacaria* of the Antilles is the type. It lives on little fishes and crustacea, which it draws out from the interstices of stones and holes in rocks by means of its long trunk or beak. Two other species are known, the *F. serrata* and the *F. immaculata*. They are all small fishes, not reaching 2 feet in length, slender and eel-shaped.

FITZJAMES. [BERWICK, DUKE OF.]

FITZSTEPHEN, WILLIAM, author of the earliest description of London extant, was of Norman extraction, but born in the metropolis. He became a monk of Canterbury, and was much connected with Archbishop Becket. He was also an eye-witness of the archbishop's murder at Canterbury. Fitzstephen is supposed to have died in 1191. His 'Description of the City of London' was part of another work, 'The Life and Passion of Archbishop Becket.' Dr. Pegge, in 1772, published Fitzstephen's original text, with an accurate translation and notes. This is the best edition.

FIUME. [CROATIA.]

FIXTURES. The term 'fixtures' in its legal sense signifies such moveable things as have been fixed in the ground, or fixed in something which is itself fixed in the ground, and which may be removed by the party who annexed them, or his personal representatives, against the will of the owner of the freehold. When the article is not so removeable, it is part of the land.

It is necessary, in order to constitute a fixture, that the article should be let into or united with the land, or to other substances previously connected therewith. Goods, and even buildings of the most ponderous description, do not fall under the description of fixtures, if they are merely laid and rest upon the earth without being let into it. Something more than mere juxta-position is required, as, for instance, that the soil shall have been displaced for the purpose of receiving the article, or that the thing shall have been connected or otherwise fastened to some fabric previously attached to the ground.

The old rule of law was, that whatever was once fixed to the land was thereby made a part of it, so as to be irremoveable by any one but the owner of the fee-simple. But the strictness of this rule has been from time to time considerably relaxed, regard being had to the object of the annexation, the nature of the article, the relation of the parties between whom questions have arisen, and other considerations. Questions as to fixtures arise principally between three classes of persons. 1st, between landlord and tenant; 2ndly, between the executors of a tenant for life or in tail and the remainder-man or reversioner; and, 3rdly, between the heir and the executor of the party who put up or attached the article to the premises.

Chitty, in his 'Treatise on the Law of Contracts,' has given a list of fixtures which have been decided or considered, according to the judges, to be removeable as between landlord and tenant. There is a treatise on the law of fixtures by Amos and Ferard.

FLABELLA'RIA, a generic title for some fossil plants, as *F. borassifolia*, from the coal formation. (Sternberg.)

FLACCUS, CAIUS VALE'RIUS, was born at Padua according to some, or at Setia in Latium according to others. Flaccus lived under Vespasian, and was a contemporary of Martial, who addressed to him one of his epigrams. He seems to have died young at Padua. He wrote his 'Argonautica' in imitation of Apollonius Rhodius. The poem is full of digressions and episodes, amidst which the main action languishes. Some of the descriptions however are good. His style is at times obscure, and he is fond of displaying his erudition. There are only eight books of his 'Argonautica,' the last of which is incomplete; the whole poem is supposed to have consisted of ten or twelve books. The best edition is by J. A. Wagner, 2 vols. 8vo., 1805.

FLACOURTIA'CEÆ, a natural order of plants. The species are natives of the hottest parts of the East and West Indies and Africa. Three of the genera, *Flacourtia*, *Hydnocarpus*, and *Chaulmoogra*, yield plants used by man. Few, if any, are cultivated for ornament.

Flacourtia was named in honour of Etienne de Flacourt, a director of the French East India Company, and the commander of an expedition to Madagascar in 1648. The species are thorny shrubs, with whitish sepals and yellow stamens. *F. Ramontchi* has a fruit which is edible, about the size of a small plum; it is red when ripe, but at length becomes violet-coloured, and has a sweet and acid taste. There is a small island off the coast of Madagascar which is covered with these trees. *F. sapida* is a native of the mountainous districts of the East Indies. The fruit is about the size of a common currant, of a red colour, and is eaten by the natives. *F. inermis* has reddish purple berries of a pleasant acid taste. It is a native of the Moluccas, where it is also extensively cultivated for the sake of its fruit.

Hydnocarpus inebrians is a native of Ceylon. The fruit when eaten produces sickness, giddiness, and a dangerous form of intoxication. It is greedily devoured by fishes, which become stupified, but when taken in this way they produce poisonous effects as food.

Chaulmoogra odorata is a native of Shilhet. The seeds are employed extensively by the natives of India as a remedy for cutaneous diseases.

FLAG, the ensign or colours of a ship; from the Anglo-Saxon *fleogon*, to fly or float in the wind. Flags borne on the masts of vessels designate the country to which they respectively belong; and they are likewise made to denote the quality of the officer by whom the ship is commanded.

The supreme flag of Great Britain is the royal standard, which is only to be hoisted when the king or one of the royal family is on board the vessel: the second is that of the anchor on a red field, which characterises the lord high admiral, or lords commissioners of the Admiralty: and the

third is the union flag, in which the crosses of St. George, St. Andrew, and St. Patrick are blended. This flag is appropriated to the admiral of the fleet.

In the British navy the centre division of a fleet is distinguished by red colours, the van by white, and the rear by blue; and these divisions are respectively commanded by an admiral, a vice-admiral, and a rear-admiral.

By 4 Will. IV. c. 13, s. 11, it is enacted that, if any person shall carry on board any vessel belonging to any of his majesty's subjects, without particular warrant for so doing, his majesty's Jack, commonly called the Union Jack, or any pendant, or any such colours as are usually worn by his majesty's ships, the person so offending shall forfeit a sum not exceeding 500*l*.

FLAG. [BANNER.]

FLAGELLANTS, FLAGELLATION. The idea of propitiating the Deity by self-torment dates from a remote antiquity. Herodotus relates (ii. 42) that the Egyptians flogged themselves at one of their annual celebrations. Flagellation was administered as a trial of fortitude to the young Lacedæmonians, who it seems, in accordance with the peculiar institutions of Lycurgus, did not attach to this castigation the idea of degradation which modern Europeans do. In Rome however the punishment of flagellation was only applied to slaves, and it seems to have been pretty common, as different classes of slaves derived their names from the kind of whips with which they were lashed. Some were called *Restiones*, because they were lashed only with cords; others *Bucedæ*, from being flogged with thongs of ox-leather. The Jews employed flagellation as a punishment, but never as a voluntary act of devotional exercise. This practice was unknown to the primitive Christians. The first known instances of this kind of self-mortification occur about A.D. 400, and from that time they became continually more frequent till the year 1056, when Cardinal Peter Damian de Honestis promoted by all his influence the practice of self-flagellation, which the learned author of the 'Ecclesiastical Annals,' Cardinal Baronius, calls 'a laudable usage of the faithful.' About the year 1260 the intoxication was complete. People began to perform their flagellations in public on pretence of greater humiliation. Regular associations and fraternities were formed for that purpose; and the extravagancies were so great that contemporary writers seem to have been struck with astonishment. The flagellants were soon accused of many crimes. The celebrated Gerson attacked them in his writings, and Pope Clement VII. declared them heretics, and as heretics many of them were burnt. It was however with great difficulty that this sect was completely extirpated.

FLA'GEOLET, a small musical instrument, played on by means of a mouth-piece. Its compass is two octaves, from F, the first space in the treble clef, to F in altissimo. The scale of the *Quadrille Flageolet* is rather more limited; and that of the *Patent Octave Flageolet* is an octave higher than the ordinary instruments. The *Double Flageolet* consists of two instruments, united by one mouth-piece, and producing double notes.

FLAGSTONE. A variety of sandstone, in which the laminated structure prevails, is thus termed. Other laminated or thin-bodied rocks, as certain limestones and some argillaceous beds of the Silurian series, receive the same title. The laminations of flagstone arise from peculiarity of deposition. The laminations of slate (properly so called) arise from a new structure superadded to that of deposition, and possessing a certain symmetry and certain relations to lines and axes, which are at least analogous to crystalline arrangements.

FLAME is the combustion of gaseous or of volatilised matter. It is attended with great heat, and sometimes with the evolution of much light; but the temperature may be intense when the light is feeble: this is the case with the flame of burning hydrogen gas, it being scarcely visible by daylight, though its heat is intense.

In the burning of a candle, the wax or tallow being first rendered fluid by heat, rises in the wick, and, although the wick supplies some hydrogen and carbon, by far the greater portion of these is yielded by the wax or tallow, which burn by the assistance of the oxygen of the air. The supply of hot vapour diminishes as it ascends, and eventually fails, and hence the flame of a candle gradually tapers to a point, and then ceases.

That flame is merely a thin film of white hot vapour, and that this combustion is entirely superficial, while inflammable matter is contained within which cannot burn for want of oxygen, is proved by inserting one end of a small glass tube into the dark central portion of a flame; the inferior unburnt vapour or gas will escape through it, and may be lighted at the other end of the tube. For various illustrations of flame, see BUDE LIGHT; DRUMMOND'S LIGHT; LAMP, SAFETY.

FLAMEN, FLA'MINES, one of the orders of priesthood in ancient Rome, like the Salii, the Feciales, and others, instituted, according to tradition, by Numa Pompilius. The several Flamines were destined to the service of some particular deity. There was the Flamen Dialis, who was consecrated to the worship of Jupiter, and was the first in rank; the Flamen Martialis, who attended to the worship of Mars; and others.

FLAMINGO (*Phœnicópterus* of modern zoologists), a genus of birds whose natural position seems to be between the waders (*Grallatores*) and the *Anatidæ*. The genus *Phœnicopterus* is placed by most naturalists within the pale of the *grallatorial* order. Mr. Swainson however appears to be one of those who place the Flamingo among the swimmers. In his 'Natural History and Classification of Birds' (1836), he says, 'The Flamingo, which has the longest legs in the Natatorial order, is so good a walker, that it only swims occasionally.' The close correspondence of many parts of the organisation of the bird with the same parts in the *Anatidæ* is certainly very palpable.

Generic Character.—Bill strong, higher than it is broad, dentilated, conical towards the point, naked at the base; upper mandible suddenly bent, curved at its point on the lower mandible, which is larger than the upper. Nostrils longitudinal in the middle of the bill, pierced through and

through near the dome of the upper *arête*, covered beneath by a membrane. Legs very long; three toes in front, hind toe very short, articulated high up on the tarsus; anterior toes united to the nails by a lunated membrane (membrane découpée). Nails short, flat. Wings moderate; first and second quills longest.

Temminck, whose generic character we have given, says that the Flamingoes live on the sea-beach or in marshes formed by salt lakes, where their food consists of testaceous mollusks, marine insects, and the spawn of fish, which they collect by plunging their long neck in the water and turning the head upside down, so as to employ with greater advantage the bend of their bill. They live in large societies. Their nest is made in the marshes, and consists of earth piled up, and upon this nest the birds sit astride, because their length of limb hinders them from incubating otherwise. Whether they are reposing or fishing, sentinels are appointed which keep a sort of guard. If anything alarms the vedette, he utters a trumpeting kind of cry, and the whole flock follow him into the air. They rarely take their repose in any other than open places; and it is asserted that their sense of smelling is so acute that they scent from afar the hunter and fire-arms. Their moult appears to be simple and ordinary, but the young birds differ much from their parents. The red or rosy plumage which covers the adult shows itself gradually, after many moults and a period of about four years. The females are less than the males, and the colours of the former want the purity which distinguish the latter; the young, at their departure from the nest, are white. The body of the Flamingo has hardly a greater covering of down than that of the other waders, the avosets alone excepted; and accordingly they do not swim habitually, like the latter birds, when they wish to go from one bank to another in deep water. The palmated feet of the Flamingoes appear to be given them to enable them to sustain themselves on the slimy bottoms of rivers and creeks, into which they wade as far as their long legs will allow them, and to walk thereon. As they fly in flocks, they make an angle like wild geese. In walking they often apply their upper mandible to the ground, and lean on it as a point of support.

The tongue of the Flamingo is remarkable for its texture, magnitude, and peculiar armature. It is almost cylindrical, but slightly flattened above, and obliquely truncate anteriorly, so as to correspond with the form of the inferior mandible. The lower part of the truncated surface is produced in a pointed form, and is supported beneath by a small horny plate. The whole length of the tongue is 3 inches; its circumference, $2\frac{1}{2}$ inches. Along the middle of the flattened superior surface there is a moderately deep and wide longitudinal furrow, on either side of which there are from twenty to twenty-five recurved spines, but of a soft and yielding horny texture, measuring from one to three lines in length. These spines are arranged in an irregular alternate series, the outer ones being the smallest, and these indeed may be considered a distinct row. At the posterior part of the tongue there are two groups of smaller recumbent spines directed towards the glottis. The substance of the tongue is not muscular, but is chiefly composed of an abundant, yielding, cellular substance, with fat of an almost oily consistence.

The edges of the beak are laminated as in the Anatidæ. 'The horny denticles of the upper mandible,' writes Mr. Owen, 'and the transverse marginal furrows of the lower mandible form together a sort of filter, and, like the plates of whalebone in the *Balænæ*, allow the superfluous moisture to drain away, while the small mollusca and other littoral animalculæ are detained and swallowed. The structure of the gullet is in accordance with the size of the substances which serve for nutriment. In the typical *Grallatores*, as *Ardea* and *Ciconia*, which swallow entire fish and other food in large morsels, the œsophagus is remarkable for its great and uniform capacity; but in *Phœnicopterus* it is not more than half an inch in diameter when dilated.'

M. Temminck positively asserts that the Flamingo of Europe and that spread over the warm climates of America are different. He states that he knows the plumage of the American Flamingo from its youth to its adult state, and declares that they are all different from the various states of the Flamingo of the ancient continent. The orange-red which pervades the whole of the plumage of the American species when it has arrived at its complete state of development is sufficient to distinguish that bird from our European Flamingo, which is of a rose colour, with wings of purple red. The young of the latter has the plumage whitish,

covered with brown streaks (mèches), very distinctly marked and long, principally on the greater wing-coverts; the American Flamingo is covered in its youth with a dull whitish gray plumage. Three species are recorded by M. Temminck.

1. The Flamingo (*Phœnicopterus ruber*, Linn.; *Ph. Antiquorum*, Temminck; *Phœnicoptère* of Buffon). Locality, south of Europe, Africa, and part of Asia.

2. The American Flamingo (*Phœnicopterus Chilensis*, Molina; *Ph. ruber*, Wilson, who regarded it as identical with the old world species). Locality, South and part of North America.

3. The South African Flamingo (*Phœnicopterus parvus*, Vieillot; *Ph. minor*, Temm.). Locality, South Africa.

The flesh of the Flamingo is said to be tolerably good; the young are thought by some equal to partridge. The inhabitants of Provence, however, are said to throw away the flesh as fishy, and only to use the feathers as an ornament to other birds at particular entertainments. Not so the Roman epicures. Apicius has left receipts for dressing the whole bird with more than the minute accuracy of a modern cookery-book, and the 'Phœnicopterus ingens' appears among the luxuries of the table in Juvenal's eleventh satire. The brains and the tongue figure as one of the favourite dishes of Heliogabálus, and the superior excellence of the latter was dwelt upon by the same Apicius, and noticed by Pliny where he records the doctrine of that 'nepotum omnium altissimus gurges.' (Lib. x. c. 48.) Neither has it escaped the pointed pen of Martial—

> 'Dat mihi penna rubens nomen; sed lingua gulosis
> Nostra sapit; quid si garrula lingua foret?'
> Lib. xiii.—lxxi.

FLAMINI'NUS, TITUS QUINTIUS, was made consul, B.C. 198, before he was 30 years of age, and had the province of Macedonia, with the charge of continuing the war against king Philip. Flamininus, having landed in Epirus, found Philip posted in a rugged pass on the banks of the Aous, and compelled him to make a hurried retreat across the chain of Pindus into Thessaly. Meantime L. Quintius Flamininus, the brother of the consul, sailed with a fleet to the eastern coast of Greece, where, being joined by the ships of the Rhodians and of Attalus of Pergamus, he scoured the coasts of Eubœa, Corinth, and other districts which were allied or subject to the king of Macedonia. The consul himself marched into Phocis, where he took Elatea, and, having there fixed his winter-quarters, he succeeded in detaching the Achæans from the Macedonian alliance. In the following year Flamininus, after some fruitless negotiations with Philip, marched from Phocis into Thessaly, where Philip was stationed near Larissa. The two armies met between Pheræ and Larissa, in a country broken by small hills, called Cynoscéphalæ, or Dogs' Heads. After an obstinate battle the Macedonians were routed, and Philip left the field and rode off towards Tempe. The Macedonians lost 8000 killed and 5000 prisoners on that day. The king asked for a truce, which was granted by Flamininus, in order that messengers might be sent to Rome to treat of peace. The senate appointed ten legates, who, in concert with Flamininus, drew up the conditions, which were that Philip should evacuate every Grecian town and fortress beyond the limits of his paternal kingdom, that he should give up all his ships of war, reduce his military establishment, and pay 1000 talents for the expenses of the war. Flamininus was then continued in his command for another year (B.C. 196), during which, at the meeting of the Isthmian games, Flamininus caused a crier to proclaim that the Corinthians, Phocians, Locrians, Eubœans, Thessalians, Phthiotæ, Magnetæ, Perrhæbi, and Achæans, were restored to their freedom. Flamininus checked by his firmness the turbulence of his Ætolian allies, who were clamorous for the destruction of Philip. In 195 B.C., Flamininus was intrusted with the war against Nabis, tyrant of Lacedæmon, who had treacherously seized Argos. Flamininus advanced into Laconia, and laid siege to Sparta, but he met with a brave resistance, and at last agreed to grant peace to Nabis on condition that he should give up Argos and all other places which he had usurped, and restore the descendants of the Messenians to their lands. The senate confirmed the peace with Nabis, and in the following year (194 B.C.) Flamininus, having settled the affairs of Greece, prepared to return to Italy. He delivered the citadel of Corinth to the Achæans, withdrew his garrisons from Demetrias, Chalcis, and the other towns of Eubœa, and, having broken up his camp at Elatea in Phocis, he sent the soldiers to embark on the coast of Epirus, whilst he repaired to Thessaly to settle the internal affairs of that country, which were in a state of great confusion. He was received in Italy with great demonstrations of joy, and the senate decreed him a triumph of three days. In the year 183 B.C., Flamininus was sent to Prusias, king of Bithynia, upon the ungracious mission of demanding the person of Hannibal, then, in his old age, a refugee at the court of Prusias. Hannibal by taking poison avoided being given up. In the year 166 Flamininus was made augur in the room of C. Claudius deceased (Livy, xiv. 44), after which he is no longer mentioned in history. There is a 'Life of Flamininus' by Plutarch.

FLAMSTEED, JOHN. The life of the first Astronomer Royal was known to the world chiefly by the results of his labours, until the year 1832, since which time his private affairs have been brought to light in an unexpected manner by the late Francis Baily's discovery of his letters, and publication of an entirely new account of him.

John Flamsteed was born at Denby, near Derby, August 19, 1646. His father was in business. At the age of fourteen he caught cold while bathing, which produced a weakness in the joints, from which he never recovered. He began his mathematical and astronomical studies at a very early age, and showed talents for constructing astronomical instruments. In or before 1667 he discovered the real causes of the equation of time, and wrote a tract on the subject, which was afterwards appended by Dr. Wallis to his edition of the works of Horrox, published in 1673. In 1669 he made an astronomical communication to

the Royal Society, through Oldenburg, their secretary, concealing his name under the anagram 'J. Mathesin a Sole fundes,' which, being transposed, gives Johannes Flamsteedius. An answer from Oldenburg, addressed to himself, showed him that he was discovered, and from that time, or rather from the date of a visit which he very shortly afterwards paid to London, he was in correspondence with many scientific men, but particularly with Sir Jonas Moore, who, in 1674, proposed to establish Flamsteed in a private observatory which he intended to build at Chelsea. In the meantime however the observatory of Greenwich was founded. Flamsteed was appointed Astronomer Royal. From this time Mr. Baily dates the commencement of modern astronomy. Up to the year 1684 he had imposed on him the task of instructing two boys from Christ's Hospital, as one of the duties of his post; and, besides this, he was obliged to have recourse to private teaching, to meet the charges of carrying on his observations. At the very same time, that part of the public which cared about the matter were beginning to require that he should print his observations.

He had at this time nothing but a sextant and clocks of Sir Jonas Moore's, and some instruments of his own. He borrowed some from the Royal Society, and, after repeatedly urging the government to provide him with an instrument fixed in the meridian, he caused a mural arc to be constructed at his own expense, which was erected in the year 1683, but proved a failure.

In the meantime he had taken orders, in 1675, having in the previous year obtained the degree of Master of Arts from Cambridge.

In 1684 his father died, and he was presented to a small living by the Lord-Keeper North. Both circumstances increasing his means, he resolved to be at the expense of a new mural arc, upon an assurance from the government (which was never fulfilled) that the outlay should be repaid. This instrument was first used in September 1689, and from that moment 'everything which Flamsteed did, every observation which he made, assumed a tangible and permanent form, and was available to some useful purpose.' When he died, the government of the day attempted to claim these instruments as public property.

The public career of Flamsteed, from this time to the end of his life, is described, when we say that he collected that enormous mass of observations which furnished the first trustworthy catalogue of the fixed stars; that he made those lunar observations on which Newton depended for the illustration and verification of his lunar theory; and that he originated and practised methods of observing which may be said to form the basis of those employed at the present time. Were it not for the celebrated quarrel between him on the one side, and Newton and Halley on the other, there would hardly be a life of so much utility as that of Flamsteed, which would afford so little materials for a popular account. The following is a sketch of the transaction.

Newton had been on terms of cordial intimacy with Flamsteed: but a coolness, the cause of which is not discoverable, had begun to exist in the year 1696. When Flamsteed had completed his catalogue (having already expended 2000*l.* more than his salary), he began to think of printing his results. But Prince George of Denmark, having heard of the extent of Flamsteed's labours, offered, in 1704, to bear the expense of printing. A committee, consisting of Newton, Sir Christopher Wren, Dr. Arbuthnot, Dr. Gregory, and Mr. Roberts, was appointed to examine Flamsteed's papers, and reported in favour of printing all of them. The superintendence of the printing, the choice of workmen, &c., was in the hands of the committee, and not in those of Flamsteed. The latter gives the detail of various vexations to which he was subjected, and which ended (for the time) in a demand that Flamsteed should give up a manuscript copy of the catalogue of stars, which was the result of the observations, and was intended to be published at the end. This was done, with remonstrance, by Flamsteed; but the catalogue (as much of it as was ready) was sealed up; and Flamsteed declares that he understood it was to be kept sealed up until the whole of the rest was finished. It was three years before the first volume was printed; and during this time many small circumstances occurred which, if Flamsteed's colouring of the more important facts be correct, show a most determined intention on the part of the committee to give annoyance. Prince George died in 1708, before the second volume was begun, and the office of the committee was gone, but they still retained the papers in their keeping. Flamsteed, thinking nothing further about immediate publication, applied himself again to his observations. In March 1710–11 he was surprised by being told that the seal of his catalogue had been broken, and that it was going through the press. Flamsteed immediately obtained an interview with Dr. Arbuthnot, who assured him that none of it was printed. This was not the fact; for in a few days Flamsteed himself received several printed sheets, and learned that Halley had publicly exhibited others in a coffee-house, and boasted of the pains he had taken in correcting their errors. The result was, that in 1712 appeared the book known by the name of Halley, and entitled 'Historiæ Cœlestis libri duo,' &c. Flamsteed, exceedingly irritated by the conduct of Newton and Halley, and being not naturally of a gentle temper, now kept no terms whatsoever with either. Newton had recommended the appointment of a board of visitors for the observatory (made up of members of the Royal Society), and Flamsteed was summoned to the Royal Society, October 26, 1711, to know if his instruments (his own property) were in order, &c. Here a warm quarrel arose. Flamsteed declared to Newton that he had been robbed of his labours, and Newton called Flamsteed various names, of which *puppy* was the least. Newton reminded Flamsteed that he had received 100*l.* a year for thirty-six years, and Flamsteed asked Newton what he had done for 500*l.* a year which he had received since he came to London. Flamsteed charged Newton with having broken the seal of his catalogue, and Newton replied that he had the

queen's order. After this interview Flamsteed resolved to print all his observations, &c., at his own expense, and applied to Newton for the manuscript of 175 sheets of observations which were in his hands. The demand was refused, and Flamsteed commenced legal proceedings for their recovery. The result of the suit is not known; but Flamsteed states that Newton at last delivered all the contested manuscript to Halley. The additional expense caused to Flamsteed by this act of Newton was about 200*l.*

Queen Anne died in 1714, and the Earl of Halifax, Newton's great supporter at court, in 1715. Flamsteed was now stronger with the government than his opponents; and the lords of the treasury, at his request, surrendered all that remained of Halley's edition (about 300 copies out of 400) to his mercy. These he immediately committed (in part) to the flames, a sacrifice, as he calls it, to heavenly truth, reserving only about 97 sheets of each, which had been printed as he wished, and which afterwards formed part of his first volume. From this time to his death, which took place at the end of December 1719, he was occupied in printing his 'Historia Cœlestis,' which however he did not live to finish. It was completed by his widow, with the aid of Mr. Crosthwait, his assistant, and his friend, the celebrated Abraham Sharp, and was published in 1725. The maps, known by the name of Flamsteed's Atlas, were superintended by the same persons. The 'Historia Cœlestis Britannica' contains a complete account of the instruments and methods employed, together with a large mass of sidereal, lunar, and planetary observations, and the result of the former, namely, the 'British Catalogue.' This work seems to us to occupy the same place in practical astronomy which the 'Principia' of Newton holds in the theoretical part.

We shall not enter on the merits of this controversy. The reader will find a short account of the attempts made to defend Newton in the *Penny Cyclopædia.*

FLANDERS, EAST, a province of the kingdom of Belgium, is bounded N. by Zeeland, E. by South Brabant and Antwerp, S. by Hainault, and W. by West Flanders. It extends from 50° 42′ to 51° 22′ N. lat., and from 3° 25′ to 40° 26′ E. long. The area is 1232 square miles. The population in 1846 was 791,616.

The principal rivers that traverse this province are the Schelde, the Lyss, and the Dender. It is further watered by several smaller streams and brooks, all of which are tributaries to the Schelde; and the trade of the province is facilitated by many canals, the most important of which are those from Bruges to Ghent, from Ghent to the Neuzen Canal, and the Moerwart Canal.

East Flanders is low and level. In many parts of the province there are beds of peat. The chief productions of the earth are wheat, rye, barley, oats, potatoes, flax, hemp, hops, madder, and tobacco. [FLANDERS AGRICULTURE.] There is but little wood of large growth in the province. The chief manufactures are lace, linen and woollen cloths, bobbin net, silk, cordage, bricks, hats, soap; and there are also cotton-actories, potteries, sugar-refineries, distilleries, and breweries. In 1840 East Flanders possessed 137 steam-engines, equivalent to the power of 1761 horses.

The capital of the province is GHENT. The following are the other principal towns:—

ALOST. DENDERMONDE *Deynze*, 9 miles S.W. from Ghent, is a very ancient town, and is celebrated for the fine quality of the geneva distilled there. The population is about 3600. *Eecloo* is situated on the high road between Ghent and Bruges. It has manufactures of woollens and cottons, soap, tobacco, and hats; and there are distilleries, tanneries, and oil-mills. It has a large weekly market for grain. Population in 1840, 8989. *Grammont* is situated on both sides of the river Dender, 18 miles S.S.E. from Ghent. It contains two churches, four chapels, a town-hall, a college, and a hospital. Cotton-spinning, dyeing, bleaching, tanning, soap-boiling, distilling, brewing, and oil-crushing are the chief branches of industry. Population about 8000. *Lokeren* is 12 miles N.E. from Ghent. It has several well-built streets, and a large market-place, a town-hall, parish church, three chapels, a hospital, and a prison. Among the fabrics produced are cotton, linen, and woollen cloths, hosiery, lace, hats, and sail-cloth; and there are extensive bleaching-grounds, breweries, dyehouses, and tanneries. Population in 1840, 16,203. *St. Nicholas*, 20 miles N.E. from Ghent, is said to have one of the largest markets for flax in the world. It is the seat of a tribunal of commerce, and has a town-hall, a college, prison, and a large square surrounded by handsome houses. It has manufactures of cotton and woollens, tobacco, soap, and hats; and there are tanneries, dye-houses, and potteries. Population in 1840, 18,526. *Ninove*, 20 miles S.E. from Ghent, is situated on the north-west bank of the Dender. It is a well-built town, and has two churches, a chapel, a town-hall, and a hospital. It has several flax-mills, some potteries, tobacco-manufactures, and oil-mills. Population about 5000. *Oudenarde* (Oudenaarden, called by the French Audenarde), 15 miles S. by W. from Ghent, is situated on the south-eastern bank of the Schelde. It is a place of great trade, being the centre of a district in which the linen manufacture is carried on, and is the market in which its products are sold. There are tanneries, breweries, salt-refineries, cotton-mills, oil-mills, and other manufacturing establishments. There are three churches, a very handsome town-hall, a hospital, and two orphan-houses. Population, 5000. *Renaix* is 20 miles S. by W. from Ghent. It is a flourishing place, and has extensive manufactures of woollens and hats, and has also a great trade in linen. The town has three churches and a hospital, and there is a magnificent château. Population in 1840, 12,509.

FLANDERS, WEST, a province of Belgium, is bounded N.W. by the North Sea, N.E. by Zeeland, E. by East Flanders, S.E. by Hainault, and S.S.W. and W. by France. The area is 1512 square miles. It lies between 50° 41′ and 51° 23′ N. lat., and between 2° 33′ and 3° 30′ E. long. The population in 1846 was 642,660.

The principal rivers of the province are the Lys, the Schelde, and the Yser. The communications between different places are facilitated by means of navigable canals: the most important of these are the canals between Ghent and Bruges, Bruges and Ostend, Dunkirk, Furnes, and Nieuport.

The production and industrial occupations of the people are similar to those of East Flanders. The agriculture of this province, as well as that of East Flanders, is of the most perfect kind. [FLANDERS AGRICULTURE.]

The capital of the province is *Bruges*. [BRUGES.] The other principal towns are the following:—

Courtrai. [COURTRAI] *Dixmude* is 16 miles S.W. from Bruges, on the eastern bank of the Yser. It contains a handsome parish church, a chapel, a hospital, and two orphan houses. Population, about 3000. *Furnes* is situated about 3 miles from the coast of the North Sea, between Nieuport and Dunkerque. The town is well built, and contains about 4500 inhabitants. It contains a cathedral, 2 churches, a hospital, a college, and several convents. It has a brisk trade in agricultural produce. It was formerly fortified, but the fortifications were demolished after the peace of 1815. Four great lines of canal meet at Furnes, whence one extends through Dunkerque to Calais, another through Bergues to St. Omer, another through Nieuport to Bruges and Ghent, and another to Dixmude and Ypres. *Iseghem*, 9 miles N. by W. from Courtrai, has manufactures of linen, tape, and hats. Population in 1840, 8780. *Menin* is situated on the left bank of the Lys, by which it is separated from France, and is 30 miles S. from Bruges. It has a considerable trade in agricultural produce, and there are manufactures of linen, lace, and soap, besides oil-mills, breweries, and salt-refiners. Population about 8000. *Nieuport*, a fortified port, little frequented except by fishermen, is 6 miles N.W. from Furnes. The chief public buildings are — a town-hall, a handsome church, two hospitals, and an orphan asylum. Population about 3000. *Ostend*. [OSTEND.] *Poperingen*, a flourishing town, is 26 miles S. by W. from Ostend. The town has two parish churches, and five which belong to convents. Coarse woollens are manufactured, and there are several oil-mills. A large trade is carried on in hops, which are grown in the neighbourhood, of fine quality and in great abundance. Population about 10,000. *Roulers* is situated on the Mandel, a small affluent of the Lys, 18 miles S. from Bruges. The inhabitants are chiefly occupied in the linen manufacture and in the bleaching of linen. Flax is largely cultivated in the neighbourhood. The pasture land in the vicinity is also very rich, and many fine cattle are reared. Population about 9000. *Thielt* is 15 miles S.W. from Bruges, on the road from Dixmude to Bruges. It is a well-built town, with many good modern houses, 2 handsome churches, establishments for bleaching linen and flax, several breweries, and many flourishing manufactures. It is the chief market for the flax trade in Belgium. Population about 12,000. *Thourout* is situated on the high road from Bruges to Menin and Courtrai. It is a well-built town, with a population of about 8000, who have a considerable trade in linen, flax, and linseed. *Warneton* is situated on the left bank of the Lys, 6 miles S.S.E. from Ypres, and has a population of about 6000. *Wervick* is also situated on the left bank of the Lys, 7 miles S.E. from Ypres, and has a population of about 5500. *Ypres* (Ypern) is a strongly fortified town, situated in a fertile plain, on the banks of the little river Yperle, in 50° 50′ N. lat., 2° 53′ E. long. The situation is somewhat unhealthy on account of the surrounding marshes. It is however a flourishing town, and has manufactures of lace, linen, serges, and other woollens, cotton, thread, and silk, and there are many tanneries, dyeing-houses, and bleaching-grounds. The town-house is a Gothic building of large size, with a tower in the centre, and there is a large Gothic cathedral, an exchange, and a royal college. Population in 1840, 15,694.

FLANDERS AGRICULTURE. — Flanders was remarkable for the cultivation of its soil long before any other country north of the Alps or Pyrenees.

The soil may be divided into two classes. The first consists of the alluvial clay-loams near the coast; the second, of various sands and light loams which are found in the interior. The most fertile is that of the low lands which have been reclaimed from the sea by embankments: it is chiefly composed of a muddy deposit mixed with fragments of marine shells and fine sea-sand. These lands are called *polders*, and their great natural fertility causes them to be cultivated with less art and industry than those lands which are much inferior. The cultivation in the polders has nothing remarkable to entitle it to much notice. The usual rotation of crops in the polders consists of—1, Winter barley after a fallow;—2, Beans;—3, Wheat;—4, Flax;—5, Clover;—6, Potatoes. The polder farmer seldom thinks of purchasing manure; and even the ashes made by burning weeds are usually sold, to be sent to the poorer sandy soils, where their effects are more perceptible. When the polders have been too much exhausted, they are frequently laid down to grass; and in a few years a very rich pasture is produced. The extent of the farms in the polders is from 100 to 250 acres. The farmers in general are in good circumstances, and the buildings substantial.

In the interior of East and West Flanders the soil varies considerably; but the principal part is of a sandy nature. The few elevations of the surface have determined the course of the principal rivers, and the basin in which each of these flows is marked with some peculiarity of soil. Thus the basin of the Schelde consists chiefly of a good loam, in which there is a considerable portion of clay; that of the Dender consists of the stiffest soil in Flanders; that of the Lys is a sandy loam; that of the Langelede is mostly a poor light sand; and that of the Durme is a light sandy loam enriched by the deposition of mud from ancient inundation of the rivers.

The poorer sands have been brought into cultivation chiefly by the persevering industry of small proprietors and occupiers. Without abundance of manure nothing can be effected there, and

consequently every attention is paid to the procuring and collecting of it from the towns, from the farms, and indeed from every available source. When the supply from all these sources is not sufficient, recourse is had to the refuse cakes of colza from which the oil has been pressed out.

In the tillage of the land the Flemings use few and very simple instruments. The common plough for light lands is a small light foot-plough, which has no wheels, and is drawn by one or two horses. In the stiffer soils the turn-wrest plough is sometimes used, made much smaller and lighter than the heavy Walloon plough.

An instrument peculiarly Flemish is the *traîneau*. This is a wooden frame of a triangular shape, covered with boards, which is drawn over the ground to smooth the surface and press in the seed. The *mollebaert* is another Flemish instrument for levelling ground. [Barren Land.] The Hainault scythe and hook are generally used for reaping corn. The most important instrument in Flemish agriculture is the spade, which is used to a much greater extent that in England, and in some instances is the only instrument of tillage.

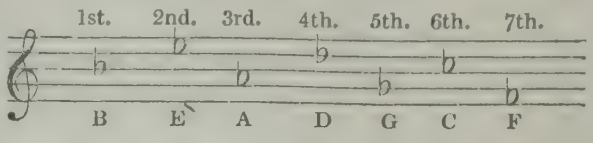
On the better kinds of light soils, which are not well adapted for wheat, the usual rotation of crops is—1st, rye, with turnips in the same year after the rye is cut; 2nd, oats; 3rd, buckwheat; 4th, potatoes or carrots; 5th, rye and turnips; 6th, flax; 7th, clover. When the sand becomes a good light loam, wheat is introduced in the rotation, after potatoes or after clover. When the land is of a better quality, although still in the class of light loams, wheat recurs more frequently, and the rotation is varied as follows:—rye and turnips, potatoes, wheat, rye and turnips, oats, flax, clover, wheat. Flax is everywhere a most important crop, for it much exceeds all other crops in value. On the heavier loams, colza, or rape, is an important crop for the seed from which the oil is expressed. Sugar-beet, potatoes, turnips, and carrots are much cultivated. Beans are not a favourite crop.

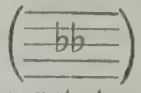
Great attention is paid to prepare the land so as to secure a good crop from a small quantity of seed. The seed usually sown in Flanders is about one-third less than in England, even when the seed is drilled, which it never is in Flanders. There are some very rich pastures in Flanders about Furnes and Dixmude, where excellent butter is made. A great many beasts are fed in the summer, and a moderately sized ox turned out in good condition in April or May will fatten on an acre of land by August or September. The breed of horses in Flanders is large and heavy, but deficient in activity, and clumsy in form. The sheep are coarse in the wool, and much inferior in the carcass to the Leicester or South-Down.

The farm-buildings are very good and convenient in general. The farms are small, compared with those in other countries; 120 acres is considered a very considerable occupation. In the Waes country, where the spade is extensively used in the cultivation of the land, the farms are very small, fifty acres being amongst the largest, and the average is not above fifteen.

FLANNEL. [Woollen Manufactures.]

FLAT, in Music, a character represented by ♭. The Flat is used to depress, by the degree of a semitone, any note in the natural scale. Where Flats are placed at the clef, they are always taken in the following order:—



The Double Flat () is sometimes employed. It lowers a note two semitones below its natural state.

FLAX (*Linum perenne*) is an annual plant, cultivated from time immemorial for its textile fibres, which are spun into thread and woven into linen cloth. It has a green stem from a foot and a half to two feet high, and a blue flower, which is succeeded by a capsule containing ten flat oblong seeds of a brown colour, from which an oil is expressed, which is extensively used in manufactures and in painting. There are several varieties of flax cultivated. The best seed comes from Riga and from Holland. There is a very fine long variety which is cultivated in the neighbourhood of Courtrai, in Flanders. The most common variety of flax is of a moderate length with a stronger stem. There is a small variety which does not rise above a foot, grows fast, and ripens its seed sooner. Another variety has a perennial root, and shoots out stems to a considerable height.

The soil best adapted to the growth of flax is a deep rich loam in which there is much humus or vegetable mould. It thrives well in the rich alluvial land of Zeeland and the polders. It is also raised with great success in the light sands of Flanders, but much more careful tillage and manuring are required. The land on which flax is sown must be very free from weeds, the weeding of this crop being a very important part of the expense of cultivation. In southern climates flax is sown before winter, because too great heat would destroy it. It is then pulled before the heat of summer. In northern climates the frost, and especially the alternation of frost and thaw in the early part of spring, would cause the flax to perish; it is consequently sown as early in spring as may be, so as to avoid the effect of hard frost. In Flanders the ground is prepared for flax more carefully than in any other country. The seed which is used is generally obtained from Riga, it being found that the flax raised from home-grown seed is inferior after the first year.

When the flax is full grown (and this depends on whether coarse or fine fibres or seeds for oil are the chief commercial object), the pulling begins, which is done carefully by small handfuls at a time. These are laid upon the ground to dry, two and two obliquely across each other. Soon after this, they are collected in larger bundles and placed with the root end on the ground, the bundles being slightly tied near the seed end; the other end is spread out that the air may have access, and the rain may not damage the flax. When sufficiently dry, they are tied more firmly in

the middle, and stacked in long narrow stacks on the ground. This is the method adopted by those who defer the steeping till another season. Some carry the flax as soon as it is dry under a shed, and take off the capsules with the seed by *rippling*, which is drawing the flax through an iron comb fixed in a block of wood. The flax is then immediately steeped: but the most experienced flax-steepers defer this operation till the next season. In this case it is put in barns, and the seed is beat out at leisure in winter.

Steeping the flax is a very important process. The object is to separate the bark from the woody part of the stem, by dissolving a glutinous matter which causes it to adhere. The usual mode of steeping is to place the bundles of flax horizontally in shallow pools or ditches of stagnant water, keeping them under water by means of poles or boards with stones or weights laid upon them. The method adopted by the steepers of Courtrai, where steeping flax is a distinct trade, is different. The bundles of flax are placed alternately with the seed end of the one to the root end of the other, the latter projecting a few inches: as many of these are tied together near both ends as form a thick bundle about a foot in diameter, and these are placed in an oblong wooden frame. The frame is sunk in the river Lys, low enough to keep all the flax under water, and is kept there till the steeping is effected. The bundles are now untied, and the flax is spread evenly in rows slightly overlapping each other on a piece of clean smooth grass which has been mown or fed off close. It is occasionally turned over, and is allowed to remain spread out upon the grass till the woody part becomes brittle. It is then taken up, and as soon as it is quite dry it is tied up again in bundles, and carried into the barn.

In the domestic manufactures the flax is broken or scutched at home, when the weather prevents out-door work. The common brake consists of four wooden swords fixed in a frame, and another frame with three swords, which play in the interstices of the first by means of a joint at one end. The flax is taken in the left hand and placed between the two frames, and the upper frame is pushed down briskly upon it. It breaks the flax in four places, and by moving the left hand, and rapidly repeating the strokes with the right, the whole handful is soon broken. It is then scutched by means of a board set upright in a block of wood so as to stand steady, in which is a horizontal slit about three feet from the ground, the edge of which is thin. The broken flax held in handfuls in the left hand is inserted in this slit, so as to project to the right, and a flat wooden sword of a peculiar shape is held in the right hand; with this the flax is repeatedly struck close to the upright board, while the part which lies in the slit is continually changed by a motion of the left hand. This operation beats off all the pieces of the wood which still adhere to the fibre, without breaking it, and after a short time the flax is cleared of it and fit to be heckled. On a larger scale the breaking, scutching, and subsequent heckling, are effected by more efficient machines.

Flax is found in every quarter of the globe, and has been cultivated for its fibrous stalk from the very earliest period of which we have any record. England has never grown a sufficient quantity of flax for its own use, although it has been attempted to give encouragement to the cultivation by public rewards or bounties. A considerable quantity of land is now sown with flax-seed every year in Somersetshire, Lancashire, and Yorkshire: it is largely grown in Scotland, and still more so in Ireland, which island produces nearly all the flax that is used in its extensive linen manufacture. It would be still more cultivated were it not an exhaustive crop for the soil: our farmers generally do not regard it with favour.

There were imported into Great Britain, in 1845, 1,418,323 cwts. of flax and tow. More than two-thirds of the whole quantity came from Russia; the remainder was supplied by Prussia, Holland, and Belgium, with the exception of a small quantity brought from France.

The exportation of flax yarn from this country has increased with great rapidity. In 1832 it amounted only to 110,000 lbs.; in 1836, to 4,574,504 lbs.; while in 1845 it reached the quantity of 23,288,725 lbs., valued at 1,060,566*l*. The woven flaxen goods, such as linen, &c., exported from Great Britain in 1845, were valued at rather more than 3,000,000*l*. sterling.

FLAXMAN, JOHN, was born at York, July 6, 1755, but was brought to London when not more than six months old. His father was a moulder of figures, and it was in his humble studio that the future artist received the first impressions of taste. Flaxman was of a weakly constitution, and, unfitted for robust amusements or employments, he had recourse to study, both literary and artistical. His mother died when he was in his tenth year, but his father's second wife behaved with great tenderness to him and his brother; and an acquaintance, the wife of the Rev. Mr. Mathew, instructed him in Greek and Latin, which probably gave him the first stimulus to study the beauties of Homer, Æschylus, and Virgil, his conceptions of which he afterwards exhibited in his compositions after those authors.

Both nature and circumstances having predestined him for sculpture, in his fifteenth year he became a student of the Royal Academy, and in 1770 exhibited his first subject, a figure of Neptune in wax. He pursued his studies with ardour, though occasionally mortified by discouragements, and though compelled to devote much of his time to providing for the exigencies of the passing day, which he did by designing and modelling for others, particularly for the Wedgewoods, to whom his talents and his taste were eminently useful. Moderate as was the remuneration, it put him at ease in his pecuniary circumstances, because he possessed a contented frugality and an utter disrelish of all expensive habits and amusements, which he preserved through life.

The year 1782 formed an important epoch in his life. He married and took a house in Wardour Street. Though the step was considered imprudent by Reynolds and others, there never was a happier union than that of Flaxman and

Ann Denman, a woman equally amiable for her virtues and her accomplishments. He soon after produced his monument of Collins, the poet, in Chichester Cathedral, and that of Mrs. Morley in Gloucester Cathedral. In 1787 he visited Italy, accompanied by his wife. While he was at Rome, he made for Mrs. Hare Nayler a series of thirty-nine subjects from the Iliad, and thirty-four from the Odyssey, illustrative of the principal events in those poems. Although the sum he received for them was small, they served to collect patrons around him; among the rest the Countess Spencer, for whom he composed his series of illustrations of Æschylus. During his stay at Rome, he executed for the late accomplished Thomas Hope an exquisite small marble group of Cephalus and Aurora. It was for him too that he produced that third sublime series of poetic compositions, the illustrations of Dante, amounting altogether to one hundred and nine subjects, namely, thirty-eight from the 'Inferno,' as many from the 'Purgatorio,' and thirty-three from the 'Paradiso.' All the three constitute an almost new province of art, combining the distinguishing qualities of picturesque and sculpturesque design.

On his return from Italy, in 1794, he took a house in Buckingham Street, Fitzroy Square, and in a very short time distinguished himself by his noble monument to Lord Mansfield. In 1797 he was unanimously elected an Associate of the Royal Academy, and from this time he was fully and profitably employed. Many of his monuments are among the finest adornments of our cathedrals and churches.

In 1810 Flaxman was appointed to the then new professorship of sculpture at the Royal Academy, to which circumstance the world is indebted for his series of lectures on the art. In 1820 his wife died, and, though he felt the loss keenly, he allowed of no relaxation in his labours, and some of his most effective works belong to this period. He died on December 7, 1826, having worked to within three days of his death, and he was buried in the churchyard of St. Giles's-in-the-Fields.

FLEA. [Pulex.]

FLE'CHE, a breastwork consisting of two faces, which form with one another a salient angle. It is constructed on the exterior of the glacis of a fortress, in order to defend by its fire the ground before the bastion and ravelin.

FLE'CHE, LA. [Sarthe.]

FLE'CHIER, ESPRIT, born in 1632 at Pernes, near Carpentras, studied in the College of the 'Fathers of the Christian Doctrine.' In 1673 the Abbé Fléchier was named a member of the French Academy; and in 1682 he was appointed by Louis XIV. almoner to the dauphiness. In 1685 he was made bishop of Nismes at the time when the persecution of the Protestants, commenced so fearfully, was consummated in the Cevennes in 1702–3. Fléchier distinguished himself for his moderation whenever he had the power to show it. He died at Nismes in February 1710. His scattered works have been collected and published: 'Œuvres complètes de Fléchier,' 10 vols., Nismes, 1782. They consist of biographies, sermons, panegyrics, and 'Oraisons Funèbres,' or funeral orations, in which last he was considered to rival Bossuet. His correspondence furnishes some interesting materials for contemporary history.

FLEET PRISON, the name of a metropolitan prison now abolished, so called from its being situated by the side of the river Fleet, which is now covered over. It was the prison to which persons were committed by the ecclesiastical courts, courts of Equity, Exchequer, and Common Pleas.

The Fleet Prison was abolished by the 5 & 6 Vict. c. 22, which established the Queen's Prison (formerly the Queen's Bench Prison) as the only prison for debtors, bankrupts, and other persons who might formerly have been imprisoned in the Queen's Bench Prison, the Fleet Prison, or the Marshalsea Prison. The building was pulled down in 1845.

FLENSBURG, a Danish town, at the southern extremity of an arm of the Baltic, and in the centre of the duchy of Schleswig, lies in 54° 47′ N. lat., 9° 27′ E. long., and has 14,000 inhabitants. It is a pleasant well-built town, inclosed by an old wall and ditch, outside of which there are three suburbs. The streets are well paved and lighted. Flensburg has a school of navigation, a college, an orphan asylum, several schools, an exchange, a theatre, and a house of correction. It has manufactories of brandy, refined sugar, tobacco, tiles, sailcloth, soap and tallow, paper, &c. There are ship-building yards, and the people of the town are owners of between 200 and 300 vessels. There is a good harbour, deep enough for large ships, but the entrance is difficult. The trade is considerable, and the exports are brandy, corn, hides and skins, soap, tallow, fish, &c.

FLERS. [Orne.]

FLETA is a commentary in Latin on the English law. It is supposed to have been written about the thirteenth year of the reign of Edward I., as the statutes passed towards the end of his reign are not noticed, while that of Westminster II. is often quoted. The author gives as the reason for the title of his book, that it was written during his confinement in the Fleet Prison; but the author is unknown. He has followed Bracton in the matter and manner of his work, having adopted his plan, and in many instances transcribed whole pages from him. He also followed Glanville in many instances; and various obscure passages of both those writers are illustrated by Fleta. Most of the subjects so minutely discussed by Bracton are passed over in Fleta in a very brief manner, so that even with the new matter this volume is not more than one-third the size of Bracton.

The work was originally published by Selden from an ancient manuscript in the Cottonian Library, together with a small treatise in law French, entitled 'Fet Assavoir,' which is a collection of notes concerning proceedings in actions, and a learned dissertation by Selden himself. Two editions only have been published in England, one in 1647, the other in 1685, which last corrects many hundred errors which had been caused in

the first edition by an unskilful copyist. It is also printed in Houard's collection.

FLETCHER, JOHN, was born in 1576, and was the son of the Rev. Dr. Fletcher, afterwards bishop of Bristol. He was educated at Cambridge with his friend Francis Beaumont. For an account of his works and his literary connection with Beaumont, see BEAUMONT. He was carried off by a plague which happened in 1625.

FLETCHER, GILES and PHINEAS, were the sons of Dr. Giles Fletcher, and cousins of John Fletcher the Dramatist.

Giles, the elder, was born about 1580, was educated at Trinity College, Cambridge, and died at his living of Alderton, in Suffolk, in 1623. The single poem which he has left, 'Christ's Victory in Heaven, Christ's Triumph on Earth, Christ's Triumph over Death, Christ's Triumph after Death,' though now seldom read, is of a high order of merit.

Phineas Fletcher, younger brother of Giles, was born about 1584, and admitted scholar of King's College, Cambridge, in 1600. In 1621 he was presented to the living of Hilgay, in Norfolk, where he died about 1660. Though he wrote other works, Latin and English, the only one by which he is now known is, 'The Purple Island, or the Isle of Man,' a description of the human soul and body, but especially the latter, much in the style of 'Christ's Triumph.'

The two Fletchers are the more remarkable as having tended to form the style of Milton's poetry, as may be seen by any one well acquainted with both.

FLETCHER, ANDREW, the son of Sir Robert Fletcher, of Saltoun, in East Lothian, was born in 1653. Andrew Fletcher's early education was superintended by Gilbert Burnet, afterwards the celebrated bishop of Salisbury, at that time parish minister of Saltoun. After travelling for a time on the continent, Fletcher on his return home obtained a seat in the Scottish parliament as commissioner, or member, for his native county, and soon became distinguished as one of the foremost opponents of the government. After some time he withdrew to Holland; on which he was summoned before the lords of the council, and, when he did not make his appearance, was outlawed, and his estate confiscated. He afterwards returned to England, and joined in the rebellion of the Duke of Monmouth; but, having shot the mayor of Lyme in a quarrel, he was forced to leave the country precipitately. He then proceeded to Spain, and afterwards to Hungary, where he took part in some military operations against the Turks, and distinguished himself by his gallantry. When the scheme of the English Revolution began to be projected, he went to Holland to take a part; he came over to England with the Prince of Orange in 1688, recovered possession of his estate, and again sat as representative for his native county. He soon however became as determined an opponent of the government of King William as he had formerly been of that of Charles II. His last exertions as a public man were directed against the scheme of the union of the two kingdoms. He died in London in 1716, He is the author of the following tracts, all of which, we believe, were originally published without his name:—1, 'A Discourse of Government with relation to Militias,' Edinburgh, 1698; 2, 'Discourses concerning the Affairs of Scotland, written in the year 1698,' Edinburgh, 1698; 3, 'Discorso delle Cose di Spagna scritto nel mese di Luglio, 1698,' Napoli, 1698; 4, 'Speeches by a Member of the Parliament which began at Edinburgh, the 6th of May, 1703,' Edinburgh, 1703; 5, 'An Account of a Conversation concerning a right Regulation of Governments for the Common Good of Mankind; in a Letter to the Marquis of Montrose, the Earls of Rothes, Roxburgh, and Haddington, from London, the 1st December, 1703,' Edinburgh, 1704. It is in this production that we find the remark so often quoted about the superior influence and importance of the national ballad-maker to the national law-giver: Fletcher gives it as the observation of a friend. The original editions of these publications are scarce, but they were all reprinted at London in an octavo volume in 1737, under the title of 'The Political Works of Andrew Fletcher, Esquire.'

FLEUR-DE-LIS, a term of blazonry for the flower which resembles an iris, and which, previously to the French Revolution, was borne first semée, and then three, as representing semée, in the arms of France. Its origin and history have been variously stated by the French antiquaries. Upon crowns and the tops of sceptres, the *fleur-de-lis* was used by other nations as well as France from a very early period.

FLEURANCE. [GERS.]

FLEURY, CLAUDE, ABBE', was born at Paris in 1640, and died in 1723, aged eighty-three years. Having completed his studies at the college of Clermont at Paris, he embraced in 1658 the profession of his father, who was a distinguished advocate, and he practised at the bar for nine years. He afterwards entered the church, and thenceforward devoted himself to the study of divinity, the Holy Scriptures, canon law, and the Fathers. In 1674 he was appointed tutor to the Princes Conti, whom Louis XIV. educated with his son the Dauphin. He was afterwards tutor to the king's natural son, the prince of Vermandois, and his grandsons the dukes of Bourgogne, Anjou, and Berri. Fleury thus became the associate of Fenelon. In 1696 he succeeded Labruyère as member of the French Academy, and in 1707 the king bestowed on him the priory of Argenteuil, in the diocese of Paris. This grant was very acceptable to Fleury, as it afforded him a comfortable retirement for the prosecution of his studies. In his retirement at Argenteuil, notwithstanding his advanced age (he was now sixty-six years old), he conceived the plan of his grand work the 'Ecclesiastical History,' and began the execution of it. After the death of Louis XIV. (1716), the Regent Duke d'Orleans nominated Fleury confessor to the young king Louis XV., a post which he held till 1722. He died a few months afterwards.

Fleury commenced his literary career with the 'Histoire du Droit François,' 1674. He afterwards published 'Institution au Droit Ecclésiastique,' 'Catéchisme Historique,' and other works.

But the most valuable of Fleury's works, and that which has established his reputation as a first-rate writer is the 'Histoire Ecclésiastique,' 20 vols. 4to. It begins with the establishment of Christianity, and extends to the year 1514. It was continued till the year 1598 by Fabre, of the Oratoire, in 16 vols. in 4to. Fleury's 'Ecclesiastical History' is translated into English.

FLEURY', ANDRE' HERCULE DE, CARDINAL, was born in 1653 at Lodève, in Languedoc, studied at Paris in the college of the Jesuits, was afterwards made almoner to the queen-consort of Louis XIV., and in 1699 bishop of Fréjus, which see he resigned in 1715, on account of ill health. Louis XIV. appointed him preceptor to his grandson, afterwards Louis XV., who became greatly attached to him. After the death of the regent in 1723, Fleury became prime minister, in which office he continued for seventeen years, till the time of his death. The period of his administration was the happiest part of the reign of Louis XV. Fleury was honest, economical, disinterested, a friend to peace, and a patron of learning. He was obliged, against his inclination, to take a part in the war of Polish succession in 1733, in which France was unsuccessful in her attempt to place Stanislaus Leczinsky on the throne, but on the termination of the war in 1736 he gained the possession of Lorraine.

In 1741 Cardinal Fleury was driven into another war, that of the Austrian succession, of which he did not live to see the end. He died in 1743, at eighty-nine years of age; and from that time the government of Louis XV. fell deeper and deeper into corruption and decay.

FLEXIBILITY is a property of bodies by which they yield transversely, on the application of some power: this property is distinct from elasticity, as it does not necessarily follow that the bodies acted on recover their original figures when the power is removed. [MATERIALS, STRENGTH OF; ROPES.]

The mathematical theory for the vibrations which may take place in a thread which is perfectly flexible, when small forces are applied to all its points, and the investigation of formulæ for determining the position and velocities of the points at the end of a given time, may be seen in Poisson's *Traité de Mécanique*, No. 482, &c., edit. 1833.

FLEXURE, CONTRARY. A point of contrary flexure in a curve is that at which the branch of the curve ceases to present convexity to a straight line without it, and begins to present concavity, or vice versâ. But, when a straight line passes *through* a point of contrary flexure, the curve presents either convexity on both sides or concavity on both sides.

FLEXURE OF COLUMNS. If the particles of which a column is composed were equal spheres in contact with each other and arranged in lines parallel to the axis of the column, a weight diffused uniformly over the top of the column, when the latter is in a vertical position, would probably produce no flexure: but, if the particles be supposed to have any tendency to slide laterally from the action of the weight at the top of the column, it must follow either that the particles thrust one another outwards all round the axis, or that, the compression of the particles being greater on one side than on another, the column is diminished in length, on the compressed side; the weight being thus made to act obliquely upon it, a general bend of the whole column in one direction is produced.

This effect takes place in pillars of iron, stone, and wood, and, when the bend becomes considerable, a rupture takes place: sometimes the fracture across the column is a plane inclined to the axis; but often a swelling appears near the middle, on the concave side, and, at the instant of rupture, a fragment in the form of a wedge is detached. The fibres of wooden pillars are generally of serpentine forms, and they adhere together laterally, with comparatively a small force: hence, when such a pillar is compressed longitudinally by a weight, the latter acts obliquely on the fibres; and thus a pillar of wood becomes bent sooner than one formed of the other materials.

When a column is bent by a weight applied at the upper end, it is evident that, on the side which is concave outwards, the particles extending to some distance within the column must be in a state of compression, while those beyond that distance, towards the side which is convex outwards, must be in a state of tension; and, in any transverse section of the column, the line on opposite sides of which the particles are in opposite states is called the neutral line. The situation of this line in any section can only, at present, be determined by experiment.

From the mathematical theory of elastic bodies it is found that the weights which solid cylindrical columns will bear in the direction of their lengths at the instant of beginning to bend are directly proportional to the fourth power of the diameter, and inversely proportional to the square of the length. Also that the force by which an elastic hollow cylinder resists the tendency to flexure by a weight acting in like manner varies with $\frac{d^4 - d'^4}{l^2}$ in which d and d' are respectively the exterior and interior diameters of the cylinder, and l its length. (Poisson, 'Traité de Mécanique,' ed. 1833, No. 315.) These formulæ must be understood however as holding good only for columns which are incompressible; and, till lately, good experiments for the determination of the actual strength of columns were entirely wanting.

This desideratum is now supplied by the valuable series of experiments carried on by Mr. Hodgkinson, and of which a full account is given in the Philosophical Transactions' for 1840 (Part ii.). The columns, which were placed in vertical positions, were of various lengths, from a few inches to seven feet six inches, and all were subjected to pressures acting vertically; some were cylindrical and others were rectangular prisms, and the former were either solid or hollow: in some cases the ends of the columns were planes perpendicular to the lengths, in order that the pressure might be diffused uniformly over those ends; and, in the others, the ends were hemispherical, in order that the pressure might be trans-

mitted almost wholly in the direction of the axis. Of the experiments alluded to, a few only can be stated here; but these may serve to give an indication of the relative strength of different columns when supporting weights, and of the inflexions which the columns experience.

A solid cylinder of cast iron, with hemispherical ends, whose length was 60.5 inches and diameter half an inch, suffered a deflexion in the middle equal to 0.23 inch, by a weight equal to 136 lbs. and broke with 150 lbs., while one of equal length, whose diameter was 1.96 inch, suffered a deflexion equal to 0.6 inch by a weight of 24,857 lbs., and broke with 25,403 lbs. A hollow cylinder of cast iron with hemispherical ends, whose length was 90.75 inches, external diameter 1.78 inch, and internal do. 1.21 inch, suffered a deflexion equal to 0.49 inch, by a weight equal to 5333 lbs., and broke with 5585 lbs., while one of equal dimensions with flat ends suffered a deflexion equal to 0.66 inch by a weight of 17,489 lbs., and broke with 17,840 lbs.

From his experiments Mr. Hodgkinson has obtained the following conclusions:—

All the pillars whose lengths exceeded four times their diameters became bent before they broke; and, when the pillars were of uniform dimensions, both ends being plane or both hemispherical, the greatest flexure was near the middle of the length, and the fracture was at that place; but, when one end was plane and the other hemispherical, the fracture was at a distance from the rounded end equal to about one-third of the whole length.

Pillars of cast iron with plane ends, and having their lengths about thirty times their diameters, were broken by weights equal to one-third or one-fourth of those which would crush them if they had been made short enough to be crushed without bending.

In some of the experiments the cast-iron columns were formed with disks at their ends, the diameters of the disks being about twice as great as those of the columns; and it was found that these sustained a greater pressure before breaking than the simple columns. When columns were thicker in the middle than at either end, their strength was thereby increased, if compared with cylindrical columns, by one-ninth or one-seventh. In the prismatic pillars, the flexure always took place in the direction of a diagonal.

In solid cast-iron pillars, whose lengths were from 30 to 121 times their diameters, the ends being hemispherical, the breaking weight, with flexure, varied nearly as a power of the diameter whose exponent was 3.76: when the ends were plane, that exponent was 3.55. When the diameter was so small that very little compression took place before the pillars broke, the exponent was nearly equal to 4, agreeably to the mathematical formula above stated. In the like pillars, whether the ends were rounded or flat, the breaking weights varied inversely as a power of the length whose exponent was 1.7. Computing therefore the coefficients, on the supposition that the diameters were expressed in inches and the lengths in feet, the expressions for the breaking weights (W) in pounds were:—for hollow cylindrical columns with hemispherical ends,

$$W = 33379 \frac{d^{3.76} - d'^{3.76}}{l^{1.7}};$$

and for such columns with flat ends,

$$W = 98922 \frac{d^{3.55} - d'^{3.55}}{l^{1.7}};$$

the same formula serving for solid cylinders by making in both $d' = 0$.

FLINDERS, MATTHEW, was a native of Donington, in Lincolnshire. He went early to sea in the merchant service. In 1795 he was a midshipman in the Royal Navy, and went to New Holland with the ship that conveyed Captain Hunter, the new governor, to Botany Bay. On board this ship he found a congenial mind in George Bass, the surgeon, with whom, in a boat only 8 feet long, and with no other companion than a boy, he ran across Botany Bay, and explored George's River 20 miles beyond the point where Governor Hunter's survey had stopped. It was not yet known that Van Diemen's Land was a separate island. Bass suggested that the heavy swell which rolled in from the westward could be produced only from the great Southern Ocean. Flinders was sent with his old companion Bass to ascertain this fact, in a decked boat, with only six men to assist them. In little more than three months the survey was made, and the name of Bass was given to this strait. In the following year, 1799, Flinders, now a lieutenant, was sent in the same small vessel to explore the coast to the north of Port Jackson. He visited and examined all the creeks and bays as far north as 25°, and returned to Port Jackson with satisfactory accounts. On his return to England he was promoted.

In July 1801, Captain Flinders sailed from England in the Investigator, a bark of 334 tons, carrying 88 men, including an astronomer, a naturalist, two painters, a botanic gardener, and a miner. Though at war with France, the English ships received a pass of protection, as being devoted to purposes of science, a similar one having been granted by the English government to Captain Baudin for his voyage round the world in the preceding year. In December 1801, Flinders commenced his survey of the south-east coast of Australia, from Cape Leuwen. He met Baudin, who, instead of going round the world, had made straight for Australia, and had devoted his whole care to the examination of Van Diemen's Land and New South Wales, evidently with the view to the formation of a French colony, but he had done very little in the way of surveying. From Bass's Straits Flinders sailed to Port Jackson, where he arrived on May 9, 1802. In July he steered northerly along the east coast, and surveyed the great Barrier Reef of coral rocks—a dangerous tract. In fourteen days he conducted the Investigator through these perilous mazes, where he had nothing to guide him but his own vigilance and skill; then bearing still north, he made Torres Straits, and surveyed the vast Gulf of Carpentaria. While engaged in this

duty, the Investigator was reported to be 'quite rotten.' Flinders kept her out till the last possible moment, prosecuting his task, and at length reached Port Jackson on June 9, 1803, when the Investigator was immediately condemned.

Captain Flinders then embarked as passenger in the Porpoise, a store-ship, in order, he says, 'to lay his charts and journals before the Lords Commissioners of the Admiralty, and obtain, if such should be their pleasure, another ship to complete the examination of the Terra Australia.' The Porpoise was wrecked on a reef in Torres Straits, but Flinders acted with admirable self-possession, and contrived to get the men safely landed on a sand-bank, a little above high-water mark. On the 26th of August he left the reef in a small open boat, to make a voyage of 750 miles, to Port Jackson, where he arrived on Sept. 6, and procured a small leaky schooner, the Cumberland, of twenty-nine tons. She was accompanied as far as the wrecks by another schooner, and by a trading vessel which was bound for China. Flinders reached the reef on October 7, and some of the men went back to Port Jackson in the schooner, some embarked in the trading ship bound for China, the rest cheerfully remained with Flinders, to make, in the ill-conditioned Cumberland, the navigation of half the globe. On touching however at the Isle of France, then in possession of the French, the vessel and all his papers were seized, and himself and crew were declared to be prisoners of war.

Flinders thought that he was detained a prisoner in order that Baudin might have the start of him in publishing, and make the world believe that it was to the French nation alone they were indebted for the complete discovery and examination of those parts. Some English writers did not hesitate to take this view of the case, and what followed in France settled the question. A volume and an atlas were published: the whole of the southern coast, including not only all the discoveries of Flinders and Bass, but also those of Nuyts, Vancouver, Grant, and D'Entrecasteaux, was laid down as new land, and called *Terre Napoléon*. Baudin had made about 50 leagues of real discovery; he claimed or seemed to claim nearly 900 leagues.

After pining six years a prisoner in the Isle of France, Flinders was liberated, and he reached England at the end of the year 1810. His charts and plans were restored to him, but one of his log-books was kept or destroyed. His health was broken, but as long as there was work to do he kept up his energy, correcting his maps, and writing out his descriptions. After revising his last sheet for press he drooped; he died in July 1814, on the very day his book was published.

(*A Voyage to Terra Australia*, &c., *in the years* 1801, 1802, *and* 1803, *in H.M. Ship Investigator*, &c., 2 vols., with Atlas, London, 1814.)

FLINT, a well-known silicious mineral, the true native place of which is the upper bed of the chalk formation, where it occurs in regular beds. Gravel consists principally of flints which have been rounded by attrition, and, by exposure to air and moisture, have acquired a yellowish red colour.

Flint is usually of a gray colour. It is rather harder than quartz; thin fragments of the black varieties are translucent; it is fragile, and, being rarely laminated, it is broken with equal facility in almost every direction. Specific gravity, 2.594. It is infusible, but becomes opaque and white by the action of heat. Flint is almost wholly pure silica.

The true origin of Flint—as it occurs in the chalk of Europe especially—has been, and still is, the subject of much discussion among microscopists and geologists. Mr. Bowerbank believes generally in the origin of flints (and some allied minerals) from sponges. Ehrenberg, finding in some flints abundance of infusorial animalculæ, suggests the origin of flint from aggregations of these silicious-shielded microzoaria. It appears desirable to prosecute still further the microscopic researches on this subject, and to extend the inquiry to other silicious minerals, especially the cherts which lie in the oolite of Yorkshire, the lias of Mendip and Glamorgan, and the mountain-limestone of Britain generally.

FLINT. [FLINTSHIRE.]

FLINTS, LIQUOR OF, or silicate of potash, is a solution of flint or silica in potash; it is soluble in water, and, when sulphuric, nitric, or other powerful acids are added to it, hydrate of silica is precipitated.

FLINTSHIRE, a county in the northern part of Wales, is bounded N.W. by the Irish Sea, N.E by the æstuary of the Dee, S.W. by Denbighshire, and S.E. and E. by Denbighshire and Cheshire. The greatest length, S.E. to N.W., is about 25 miles; the width, S.W. to N.E., is generally about 8 miles. There are also two outlying portions. The entire area is 244 square miles, or 156,160 acres. The population in 1841 was 66,919.

The coast is generally low, and is skirted by sands. There are no hills of great elevation. A range extends S.E. to N.W., from the slopes of which many small streams flow, on one side into the Dee, and on the other into the Alen. Another range enters the county on the N.W., from which flow some of the affluents of the Clwyd. The Clwyd, rises on the eastern declivity of the Bronbanog Hills in Denbighshire, and flows first S. and then E.N.E. A little above Ruthyn it turns N., and flows through the fine vale of Clwyd, partly in Denbighshire and partly in Flintshire. The whole course of the Clwyd is about 30 miles.

The new red sandstone occupies much of Flintshire. The coal-measures occupy the coast of the æstuary of the Dee, and the coal-field, which has several seams of various thickness, extends across the county. Many pits are worked. Beds of shale and sandstone underlie the coal-measures, and crop out from beneath them, separating the coal-field from the district occupied by the mountain-limestone. This last-named rock occupies all the remainder of the county, except a small tract occupied by the old red sandstone: extensive lead mines are worked in the limestone, especially in

the neighbourhood of Holywell. Copper, iron, zinc, and calamine are also found.

Divisions and Towns.—Flintshire is divided into 5 hundreds. It is, with some exceptions, in the bishopric and archdeaconry of St. Asaph. It is included in the North Wales and Chester circuit. The assizes are held at Mold. One member is returned to parliament for the county, and another is returned for Flint and its contributory boroughs.

The following are the principal towns, with the population of each in 1841 :—

St. Asaph. [ASAPH, ST.]

Bangor is a village beautifully situated on the banks of the Dee, in the outlying portion of the county which occupies a part of Shropshire. A college and a monastery are said to have been here in British and early Saxon times. Population of the village, 596.

Flint, from which the county derives its name, is situated on the æstuary of the Dee, 12 miles N.W. from Chester. It was probably a Roman station. Roman antiquities have been dug up in the neighbourhood, and traces have been found of Roman establishments for the smelting of the lead-ore dug in the neighbourhood. The castle was probably built by Edward I. The remains stand a little to the north-east of the town on the summit of a rock of freestone. The town contains a county gaol, a guild-hall, a national school-house, an almshouse for twelve poor burgesses, a parochial chapel, and two or three dissenting places of worship. The obstructions caused by the shifting sands in the channel of the Dee above Flint have caused this place to become in some degree the port of Chester, and the approach to the quay has been so much improved that large vessels can come up to it at any time of the tide. The neighbouring lead and coal mines, and the works for smelting the lead, give employment to a great number of persons, and furnish the principal articles for export. Flint is a municipal borough governed by 4 aldermen and 12 councillors. Population of the town, 1961. The parliamentary borough returns one member, and includes the contributory boroughs of St. Asaph, Caergwrle, Caerwys, Holywell, Mold, Overton, and Rhuddlan. The Chester and Holyhead Railway passes by Flint.

Holywell is situated on an eminence near the æstuary of the Dee, 4 miles N.W. from Flint, and in the line of the Chester and Holyhead Railway. It was formerly an inconsiderable village, but the minerals of the neighbouring country, and the manufactures connected with them, have rendered it a flourishing town. The mines supply lead, copper, calamine, and other ores, and there are smelting-furnaces, copper-works, brass-works, wire-works, &c. Steam-power is used as well as the stream which issues from the well of St. Winifrede, from which the town derives its name. The water was formerly in great repute for the cure of diseases, and the well was resorted to by large numbers of pilgrims. The spring throws out more than 80 hogsheads a minute, and over its octagonal well is a beautiful Gothic chapel erected in the reign of Henry VII. From the well the water flows into a rectangular bath 12 feet by 7, and the stream, in the short course of one mile, drives several mills. The harbour from which the manufactures are shipped is small and inconvenient. The town has a parish church and places of worship for dissenters. Population of the town, 4313. It is a contributory borough to the Flint parliamentary district. Population of the borough, 10,834.

Mold, the present county and assize town, is situated on the west bank of the river Alen, 6 miles S. from Flint. The town consists of one main street, with two or three smaller ones intersecting it at right angles. There are no public buildings except the church, two or three dissenting meeting-houses, and a school-house. Mold is a contributory borough to the Flint District. The township and borough are coincident. Population, 3557.

Overton is in the detached portion of Flintshire which occupies a part of Shropshire. It is situated on a high bank, which overlooks a rich meadowy flat, watered by the Dee on the east. The church is a handsome building. Over the Dee is a stone bridge of two arches. The parliamentary borough, contributory to the Flint District, is coextensive with the parish. Population, 1662.

Rhuddlan is situated on the eastern bank of the Clwyd, rather more than two miles above its mouth. Rhuddlan Castle, built by Edward I., was garrisoned for Charles I., but was taken by General Mytton in 1646, and in the following year was ordered by the parliament to be dismantled. The village of Rhuddlan consists of one principal street running down to the Clwyd and some smaller streets. The castle, the church, and the ancient priory, are the principal objects of interest. There is a bridge over the Clwyd of two arches, rebuilt or repaired about 1595. The castle is on the bank of the Clwyd, a little way above the bridge. Three round towers and a square tower are tolerably entire, and there are remains of other parts. About half a mile south of the castle stood the priory of Black Friars, founded some time before 1268, and which continued till the Dissolution. There is a fragment of this priory remaining, but the rest has been converted into a farm-house and barn. The river Clwyd is navigable up to the bridge at spring tides for vessels of 70 or 80 tons. The lead mines to the east of the town give employment to a considerable number of persons, and there is a large export of corn. Rhuddlan is a contributory borough to the Flint District. The population of the parish is 2415, including several small townships, of which the largest is *Rhyl,* a bathing-place, with a population of 974.

History and Antiquities.—Flintshire was comprehended in the territory of the Ordovices, and of the Cornarii. The Romans formed the county into two districts, and had stations near Bodfari and Bangor. Under the Saxon rule Offa's Dyke and Wat's Dyke were formed. The contests between the Saxons and the retreating Britons were frequent and sanguinary; and so likewise were those between the Normans and the Welsh.

In the time of Henry II. the county appears to have fallen again into the hands of Welsh, and

was the scene of fierce contest when the English monarch attacked North Wales. In subsequent periods antecedent to the final reduction of the Welsh, Flintshire continued to be debateable ground, and was the frequent scene of petty hostilities. Flintshire appears to have been constituted a county in the time of Edward I.; it was part of the earldom of Chester, and long continued to be under the jurisdiction of the chief justice of Chester. The county and the borough of Flint, with its contributaries, received the privilege of sending representatives to parliament in the reign of Henry VIII.

In the civil war of Charles I. this county was the scene of many contests, which ended in the dismantling of the castles of Flint, Hawarden, and Rhuddlan.

Among the remains of past ages the castles are the principal: those of Flint, Mold, Caergwrle, Rhuddlan, Hawarden, and Basingwerk are the chief. Of the ancient religious edifices the principal are — the cathedral of St. Asaph; the churches of Mold and Northop, near Flint; the abbey of Basingwerk, and the chapel over the spring at Holywell. Northop church is in the perpendicular English style, and has a lofty, handsome, and well-proportioned tower. Basingwerk Abbey is of ancient but uncertain foundation. Henry II. established here a house of Knights Templars. The remains consist of the refectory, the chapel of the Knights Templars, and some remains of offices.

FLINTY-SLATE, or *Silicious Schistus*, is a substance which is found of various colours, gray, blueish gray, and red; its structure is rather slaty; it contains about 75 per cent. of silica, the remainder being lime, magnesia, and oxide of iron. It is employed, when polished, for trying gold by a comparison of colours, and has thence obtained the name of *Touchstone*.

FLOATING BRIDGE. [Bridge.]

FLODDEN FIELD. [James IV.]

FLOOR. [House.]

FLOOR-CLOTH is made partly of hemp and partly of flax, the former being the cheaper of the two, but the latter better fitted to retain the oil and paint on the surface. As a means of avoiding the necessity for seams or joinings in the cloth, looms are constructed expressly for the weaving of the canvas, of the greatest width likely to be required. As brought to the floor-cloth factories, the pieces of canvas have generally one of these scales of dimensions: a hundred yards long by six wide, a hundred and eight yards by seven, a hundred and thirteen yards by eight. The flax and hemp are spun, and the canvas woven, almost entirely in Scotland, chiefly at Dundee; and the degree of fineness is generally such as to present about sixteen or eighteen threads to the linear inch.

The canvas is cut into pieces varying from sixty to a hundred feet long: each of these pieces is stretched over a frame in a vertical position; and in most of the factories there is a large number of such frames, some a hundred feet long by eighteen or twenty high, others sixty feet long by twenty-four high. A wash of melted size is applied by means of a brush to each surface; and, while this is yet wet, the surface is well rubbed with a flat piece of pumice-stone, whereby the little irregularities of the canvas are worn down, and a foundation is laid for the oil and colour afterwards to be applied. The paint employed consists of the same mineral colours as those used in house-painting, and, like them, mixed with linseed oil; but it is much thicker or stiffer in consistence, and has very little turpentine added to it. The canvas receives many coatings on the back as well as the front, and is well dried and smoothed at intervals.

The printing of floor-cloth is conducted much on the same principle as that of paper-hangings for rooms, and that of 'colour-printing,' viz. the successive application of two or more blocks or engraved surfaces, each one giving a different part of the device from the others, and being supplied with paint of a different colour. As at present conducted, the pattern is engraved or cut upon blocks of wood, formed of pear-tree on one side and deal on the other: they are about fifteen inches square; and each block is to give the portion of the device which is to be in one particular colour.

The blocks (which we will suppose to be four for one pattern, red, yellow, blue, and green) being ready, and the prepared canvas spread out on a flat table, the printing commences. The paint (say red) is applied with a brush to the surface of a pad or cushion formed of flannel covered with floor-cloth; the block, held by a handle at the back, is placed face downwards on this cushion, and the layer of paint thus obtained is transferred to the surface of the canvas by pressing the block smartly down on the latter. A second impression is made in a similar way by the side of and close to the first; and so on throughout the length and breadth of the canvas; each impression being about fifteen inches square. The proper junction, or 'register,' of the successive impressions is aided by pins at the corners of the blocks. When the whole surface is thus printed with one colour, all the other three are similarly applied in succession. Such would likewise be the case if the number of colours was more than four: but the greater the number the greater would be the care necessary in adjusting the numerous partial impressions so as to insure a proper arrangement of the whole.

FLO'RA, in the Roman mythology, was the goddess of spring and of flowers, and the wife of Zephyr. Flora was also the assumed name of a Roman courtesan, who instituted certain games or festivals called Floralia, which were celebrated at the end of April, and in which women of loose character performed dances and mimic fights, throwing beans and chick-peas among the crowd. Floral games, 'Jeux Floraux,' was the name given to the poetical assemblies and competition for prizes held at Toulouse. [Clemence Isaure.]

FLORAC. [Loze're.]

FLORENCE (*Compartimento di Firenze*), one of the five provinces into which Tuscany is divided, is bounded N. by the province of Bologna in the Papal State, N.E. by the province

of Ravenna in the same state, E. by the Tuscan province of Arezzo, S. by that of Siena, W. by that of Pisa and by the duchy of Lucca, and N.W. by the duchy of Modena. Its greatest length, E. to W., is about 70 miles, and its breadth about 60 miles. The area is 2241 Italian square miles of 60 to one degree of latitude. The population, in 1844, was 721,723.

The surface of the country is in a great measure mountainous, being intersected from north-west to south-east by the central Apennine range. The finest part of the province lies south-west of the Apennines, and consists of the great valley of the Arno, which crosses it from east to west, and of numerous lateral valleys, the principal of which are—the Val di Greve, below Florence; Val di Pesa; Val d'Elsa; Val d'Era, on the borders of the province of Pisa; Val di Sieve, called also Mugello, north of Florence; Val di Bisenzio or of Prato; Val d'Ombrone or of Pistoia; Val di Nievole. The valleys produce corn, wine, oil, silk, and abundance of fruit. The mountains are adorned with chestnut-trees and timber-trees. The chief manufacture is straw-plat. The other manufactures are pottery and china-ware, cloth, paper, leather, &c., mostly for home consumption.

For administrative purposes the province is divided into 28 districts called cancellerie, which contain altogether 90 communes, having each a gonfaloniere and a communal council. The districts have each a political governor, called cancelliere.

The following are the principal towns:—

Empoli is an ancient and thriving town, on the south bank of the Arno, about 15 miles W. by S. from Florence. The collegiate church was originally built in 1093, but has been much repaired and altered. The palace yet remains in which, in 1255, it was proposed in a parliament of the Ghibellines to substitute Empoli for Florence, as the capital of the republic. Population, about 6000. *Fiesole* is situated on the top of a hill a short distance N.E. from Florence. Much of the ancient Etruscan wall of the city yet remains, composed of huge stones of Cyclopean masonry. A fine old cathedral, some other churches, one of which is extremely ancient, the humble Palazzo del Commune, and the lowly dwellings of the inhabitants, who do not exceed 3000, are all that remains of the ancient city Fiesole. *Firenzuola*, a small but rather active town, is situated near the northern boundary of the province on the old road from Florence to Bologna. *Florence.* [FLORENCE.] *Pescia*, a small but flourishing city, with a population of 7000, beautifully situated about 12 miles W. by S. from Pistoia near the boundary of Lucca. It has an ancient cathedral and other churches. *Pistoia.* [PISTOIA.] *Prato*, 12 miles N.W. from Florence, an ancient walled town, has a fine old cathedral, several other churches, a college, a hospital, and about 10,000 inhabitants. *Volterra.* [VOLTERRA.]

Further particulars concerning the government, industry, commerce, and other statistics of this country are given under the head TUSCANY.

FLORENCE, FIRE'NZE, or FIORE'NZA, the capital of the Grand Duchy of Tuscany, and an archbishop's see, is situated in the valley of the Arno, which river divides it into two unequal parts, the larger or original city being on the right or northern bank. Its shape is a pentagon about six miles in circuit; it is inclosed by walls and has eight gates, six of which open to high roads leading to Arezzo, Siena, Pisa, Pistoia, Bologna, and to the Vallombrosa and the Casentino. Four bridges over the Arno connect the two parts of the city. In the central or most ancient part of Florence the streets are mostly narrow and irregular, and many of the houses have a mean or dilapidated appearance, though here and there are fine churches and massive square stone palaces. But the streets which lead from this central part to the present gates and which from their more recent date are still called Borghi, or suburbs, are laid out on a regular plan. The most remarkable structures in Florence are,—1. The Duomo or Cathedral, which was begun at the end of the 13th century by Arnolfo di Lapo, was continued by Giotto and other successive architects, until Brunelleschi completed it in the 15th century by raising the noble cupola which excited the admiration of Michel Angelo. This magnificent building is surrounded by an open place; on one side of it rises a detached square tower or belfry 250 feet high, and before it the baptistery of St. John, an octagon chapel rich with sculptures and mosaics. The whole group of buildings is cased in marble party-coloured black and white. 2. The Palazzo Vecchio, or town-house, a square massive-looking structure surmounted by a tower 260 feet high. The square in front is adorned with a noble fountain and with marble and bronze statues. 3. Gli Ufficii, with arcades forming three sides of an oblong court 400 feet in length: the first story is occupied by the archives, the treasury, other public offices, and the Magliabecchi library, which contains 150,000 printed volumes and 12,000 MSS. The second story contains the celebrated galleria, or museum, formed by the Medici, which is one of the richest existing collections in sculptures, medals, cameos, bronzes, paintings, and other works of art. 4. The Church of San Lorenzo, built by Brunelleschi, the numerous altars of which are adorned with the paintings of Florentine masters. 5. The Church of Santa Croce, remarkable chiefly for the sepulchral monuments of Machiavelli, Michel Angelo, Galileo, and Alfieri. 6. The palace Pitti, the residence of the grand duke, begun by Brunelleschi and finished by the Grand Duke Cosmo I., has a splendid gallery of paintings, and a library of 70,000 printed volumes and 1500 MSS. Besides the above are—the palace Riccardi, with its valuable library; the palace Strozzi, one of the most remarkable specimens of the old massive and stern Florentine architecture; the modern palaces Corsini, Borghese, and many others; the churches of San Marco, Santa Maria Novella, l'Annunziata, Ognissanti, &c.; the two principal theatres; the Academy of the Fine Arts; the hospitals; and the public walks outside the gates. The educational, scientific, and charitable institutions are on a respectable footing.

Florence is upon the whole the most pleasant place of residence in all Italy. Strangers have also the advantage of the best reading-rooms in the whole peninsula, which are supplied with foreign journals and literary novelties. The whole neighbourhood of Florence is studded with villas, country-houses, and gardens.

This town owes its origin to a colony of Roman soldiers, sent by Cæsar Octavianus after the victory of Perusia, to whom he allotted part of the territory of the colony of Fæsulæ, established about forty years before by Sulla. Occasional mention is made of it during the Roman empire, and during the various invasions of the Goths. The Longobards occupied Florence, apparently without violence, and Tuscany became one of the duchies of their kingdom. Charlemagne, having conquered the Longobards, organized the various provinces of their kingdom, and gave to Florence a sort of municipal government. From about the year 1115, the towns of Tuscany began to govern themselves as independent commonwealths, and the popes favoured this state of things. Florence had then a very limited contado, or territory, extending only a few miles round its walls; but the industry and speculative spirit of its citizens wonderfully enriched them.

The most remarkable feature in the history of Florence has been the internal dissensions among her most powerful citizens. When the struggle for temporal power took place between the popes and the emperors, Florence was for the most part favourable to the former; but, as some of the most influential inhabitants favoured the emperors, the seeds of discord were sown, which led to many fierce contests afterwards. Such was the feud between the Uberti family and the municipal council in 1177; the feud between the Uberti and the Buondelmonte, &c. These gave rise to actual wars in the 13th century.

After the feuds of the Bianchi and the Neri, and the banishment of the former, the Florentines besieged and took Pistoia by famine in the year 1306; and during the same century they were frequently at war with other Italian cities. Yet these wars, with their chequered results, did not drain the sources of the extraordinary wealth and power of the Florentines. These sources were twofold, the numerous manufactures at home and the trade and banking speculations carried on by Florentine merchants abroad. Among the manufactures the most important were those of woollens, silks, and jewellery. The citizens of Florence were classed from 1266 into 12 arti, or companies of trades or professions. Every citizen who wished to be eligible to office was required to inscribe his name on the rolls of one of the trades. Their armies were chiefly composed of mercenaries and auxiliaries, and mostly commanded by a foreign captain, or condottiere. The towns and districts subject to Florence retained their local statutes, and elected their own magistrates, but they had no share in the central government of the republic.

The Florentines sometimes placed themselves under the protection of some neighbouring potentates; but these protectors generally contrived to make themselves soon unpopular, and were expelled by the citizens. Frequently, too, the trades gave battle to the nobles within the streets of Florence itself. The wealthy family of the Albizzi remained at the head of the republic, during the greater part of the time from 1343 to 1434; in which last-mentioned year the administration of the Albizzi was overthrown by Cosmo de' Medici, a popular citizen and a princely merchant. From that moment the history of Florence became closely connected with that of his house. [MEDICI; TUSCANY.]

FLORENCE. [ALABAMA.]

FLORENTI'NUS, a Roman jurist, lived after the Emperor Antoninus Pius. ('Dig.' 41, tit. 1, s. 16.) He wrote eleven books of Institutiones, from which there are a few excerpts in the 'Digest.'

FLORES, sometimes called *Endé*, an island in the Indian archipelago, lying between 8° and 9° S. lat., and between 120° and 123° E. long. Its length is about 200 miles from east to west, and its average breadth about 35 miles. The surface of the island is hilly, and there are several high volcanic mountains. The principal port, Endé, on the south side of the island, has an excellent harbour. The coast is mostly colonised by Bugis and Malays, but the interior is inhabited by aborigines.

FLORES. [AZORES.]

FLORIAN, JEAN PIERRE CLARIS DE, was born of a noble but poor family in the Château-Florian, in the Cevennes, in 1755. He became in 1768 page of the Duc de Penthièvre, afterwards served a short time in the army, and then accepted the place of gentleman in ordinary to the duke, who treated him as a friend. He now devoted himself to literature, and produced in 1783 the romance of 'Galatée,' which was followed by 'Numa Pompilius,' published in 1786, and by several others. He also wrote a collection of fables and a number of little comedies, in the Italian style, with Arlechino for their hero, which were very successful. In 1793 he was banished from Paris by the decree published against the nobility, and subsequently arrested and imprisoned. Though soon liberated, his health was so much affected that he died in 1794.

Florian was not an original writer, but his Fables contain some very neat and accurate descriptions, and 'Numa Pompilius' retains its place as a school-book.

FLO'RIDA, one of the United States of North America, was first discovered by Sebastian Cabot, in 1497, but the name was given to it by Juan Ponce de Leon from his having discovered it on Palm Sunday (called, in Spanish, Pasqua Florida) in 1512. During a great part of the sixteenth century the southern part of the eastern coast of North America continued to bear this name, which was gradually restricted to that portion of this coast now called Florida. This State comprehends a peninsula, lying beteen 25° and 30° 45′ N. lat., and 80° and 83° W. long., besides a tract of land extending along the northern shores of the Gulf of Mexico, beteen 29° 40′ and 31° N. lat., and 83° and 87° 20′ W. long. It greatest length is 380 miles; the width varies from 30 to 250 miles.

The area is 57,000 square miles. The population in 1840 was 54,477, of whom 25,707 were slaves.

Opposite the southern extremity of the peninsula there is a series of keys (a corruption of *cayos*), or islands, mostly covered with wood. These islands, which are called the Florida Keys, are skirted towards the south and east by narrow reefs, called the Florida Reefs. The whole of the eastern coast of the peninsula is flat, and skirted by low narrow islands of sand, separated from the mainland by narrow and shallow lagunes, which cannot be navigated even by vessels of small burden. This coast has no harbours, except at the northern extremity, where that of St. Augustine has 10 feet water at high tides, that of St. John 15 feet, and St. Mary's 20 feet. There are many bays on the western side of the peninsula, which form good harbours. Tampa Bay is spacious, and admits vessels of considerable burthen; but the best harbour is Pensacola, in the western part of Florida, which admits vessels drawing 20 feet of water, and is the deepest port on the northern coast of the Gulf of Mexico.

The surface of the country is uneven, but it contains no high hills. The peninsula is drained by several small rivers, and by the St. John River, of which the main branch, the Ocklawaha, rises midway between both seas, and runs north for about 80 miles, when it turns east, and joins the other branch, or proper St. John. After their union, the channel of the river is very wide, and the current is very slow for the remainder of its course, which rather exceeds 80 miles, and is directed to the north till it turns eastward, and falls into the Atlantic. It is 15 feet deep, and may be navigated some distance above the place where the two branches unite. The Appalachicola, the chief river of the western part of Florida, is navigable for about 80 miles from the Gulf of Mexico, by vessels drawing 8 feet of water. The St. Mary's river forms a part of the boundary line between Florida and Georgia, and the Perdido divides Florida from Alabama.

Florida has a considerable number of lakes, the largest of which are in the swampy districts of the peninsula. The Lake of Macaco is the most extensive. Lake George, which is an expansion of the St. John's River, is 18 miles long and 12 wide.

The climate of Florida is favourable to the cultivation of most of the productions of the West Indies, where the soil is suitable. The sugar-cane may be cultivated in all the maritime parts, and the orange flourishes. Cotton is the chief agricultural production, but rice, indigo, tobacco, Indian corn, and a great variety of fruits are also cultivated. Pine trees cover a great part of the northern districts, but the forests contain also cedars, chestnuts, magnolias, cypresses, and other trees.

Wild quadrupeds of the larger description are not numerous, except deer. Alligators, turtles, and snakes are very common.

Tallahassee is a city and the capital of Florida. It is 22 miles N. from St. Marks, its port, in the western part of the State, and contained in 1843 a population of 2,500. *Appalachicola*, a port of entry, 135 miles S.W. from Tallahassee, is situated on a bluff at the mouth of the Appalachicola river, on the west side. It has a considerable export cotton trade. *St. Augustine*, a town and seaport on the eastern coast, is protected from the swell of the Atlantic by Anastasia Islands. It has a good coasting trade. The population in 1840 was 2500. *Key West*, is situated on one of the Florida Keys, an island 4 miles long and 1 wide. It has a good harbour, which admits vessels drawing 27 feet of water. The inhabitants, about 500, are chiefly employed as wreckers and in making sea-salt. About 50 vessels are wrecked annually on the Florida Keys. *Pensacola*, a city and port of entry, is situated in Pensacola Bay, 10 miles from its entrance into the Gulf of Mexico. The wharf extends 600 feet in the bay, which has places of anchorage for large frigates as well as for smaller vessels. The United States' navy yard is 5 miles from the entrance of the harbour, and covers 80 acres, inclosed by a high brick wall. Population of Pensacola about 2500.

In 1843 the imports of Florida amounted to 158,631 dollars; the exports to 766,335 dollars. Florida has no college. There were, in 1840, 18 academies and grammar schools, with 732 students, and 51 common and primary schools, with 925 scholars. The Episcopalians, Presbyterians, Methodists, and Roman Catholics have each congregations and ministers.

A railroad extends from Tallahassee to St. Marks, 22 miles. Another extends from Lake Wicomico to St. Joseph, 12 miles, and another from St. Joseph to Iola, on the Appalachicola, 30 miles.

Florida was constituted a State in 1845. The governor is elected by the people for 4 years, and is ineligible for the next 4 years. The senators are elected for 2 years, and the representatives annually. The right of voting is possessed by every white male citizen of 21 years of age and upwards, who has resided in the State for two years next preceding an election, and the last six months in the county for which he votes. The number of senators in 1846 was 17; the number of representatives was 41. Florida sends 2 senators and 1 representative to Congress.

In 1763 Florida was ceded to Great Britain by Spain, in exchange for Havana. It was reconquered by the Spaniards in 1781, and was confirmed to them by the peace of 1783. In 1821 it was ceded by the Spaniards to the United States.

(Haskel and Smith, *United States' Gazetteer; American Almanac for* 1847.)

FLORIN. [Money.]

FLORIS, FRANS, or *Frans de Vriend*, was born at Antwerp, in 1520; his father, Cornelius de Vriend, was a sculptor, and Frans was himself a sculptor in his earlier years. He studied the works of Raphael, Michel Angelo, and the antique, for some years at Rome, and returned with a great reputation to Antwerp. He died at Antwerp in 1570.

One of his best works is a Nativity, in the Cathedral at Antwerp, which Sir Joshua Reynolds admired, as he did also his Crucifixion, at the Recollets.

FLORUS, LUCIUS ANNÆUS, a native of Spain, or, according to others, of Gaul, lived under Trajan and Hadrian. He wrote a small work entitled 'Epitome Rerum Romanarum,' in 4 books, from the foundation of the city to the closing of the Temple of Janus by Augustus. The author compiled his epitome from Livy and from other historians whose works are lost. It is a meagre work, and often defective in its chronology and geography. The work is of some use as a substitute for those books of Livy which are lost. Some MSS. attribute to Florus also the Epitomæ, or heads of contents, of the books of Livy. The best edition of Florus is by Duker, Leyden, 1722 and 1744.

FLOTSAM, or FLOATSAM, is such portion of the wreck of a ship and the cargo as continues floating on the surface of the water. *Jetsam* is goods which are cast into the sea, and there sink and remain under water. *Ligan* is goods sunk in the sea, but tied to a cork or buoy, in order that they may be found again.

Flotsam, jetsam, and ligan belong to the king, or his grantee, if no owner appears to claim within a year after they are taken possession of by the persons otherwise entitled. They are accounted so far distinct from legal wreck, that by the king's grant of wreck, flotsam, jetsam, and ligan will not pass.

Wreck is frequently granted by the king to lords of manors, as a royal franchise; but, if the king's goods are wrecked, he can claim them at any time, even after a year and a day. The same distinction, it is presumed, would prevail with respect to flotsam, jetsam, and ligan.

FLOUNDER. [Pleuronectidæ.]

FLOUR. [Wheat.]

FLOUR, ST. [Cantal.]

FLOWER. [Inflorescence.]

FLOWERS AND FLOWER GARDENS. It is obviously desirable, where the varieties of flowers cultivated in a garden are few in number, that they should be chosen with regard to the following qualities: the size, the brilliancy, and the smell of their blossoms, the variety of their colours, and more especially the length of time which they continue to blow. This last point is very material, because, if it is disregarded, a large stock of plants will be requisite to keep up a succession, and the labour of planting and replanting, moving and removing, will multiply trouble and expense. As a very large majority of annuals are deficient in this quality, it must be to biennials and perennials that the gardener must chiefly trust. Many of these plants not being sufficiently hardy to stand exposure to an English winter, some shelter must be provided for them during that season. Room for a considerable number may commonly be found in the house of the owner of the garden: they can be placed in windows and in passages, where they will remain in health, if in cold weather the house is continually inhabited. If this cannot be done, shrubby plants may be tolerably well preserved by taking them up at the beginning of winter, cutting back the branches, and stowing the roots in a dry cellar, whence they must be taken early in the spring, and potted and watered in a shed-room or very sheltered place, to forward them for the summer. The best method of keeping them in the winter (and in this method with care there is no risk whatsoever of loss) is in a brick pit with two or three glass lights, warmed by a small stove and flue.

Plants may be multiplied in many ways, by budding, grafting, inarching, by layers, pipings, and cuttings, by suckers, the division of roots and tubers, and by seed; and there are very few species from which, by some of these methods, an increase cannot be obtained. So easily, indeed, is the multiplication of plants, and so large a number of new plants can with proper management be raised from one original stock in the course of a year, that the nursery gardeners find it impossible (except in rare instances) to maintain a high price for a new flower beyond two or three years: the first year the price of a new flower may be 5*l.*, the second it will be about 30*s.*, the third not more than 2*s.* 6*d.* The method applicable to the greatest number of plants, and which is successful with ordinary management, is that of cuttings: from the parent plant small slips or cuttings are taken where the wood is not very tender, and if practicable at a joint. The cuttings should be planted about two inches apart, in large pots or boxes, and the pots placed in a moderately warm hot-bed, shaded from the sun. In about a fortnight they will strike root, and begin to grow. The time of removing the plants from their winter quarters must depend upon their nature and the climate in which they are to grow. The last week in May or the first in June is the earliest time at which the tenderest will bear a thorough exposure; for one or two previous weeks they should be hardened by gradual exposure to the wind and cold nights, care being taken to protect them with mats if either should be in excess. Perennial herbaceous plants may be easily multiplied by dividing the roots either in the autumn or in spring. Annuals are principally raised from seed sown in April and May, either upon a hot-bed, from which they must be transplanted, or in the situation in which they are to grow. Sweet-peas and mignonette, Nemophylla insignis, poppies, &c., are very shy of being transplanted, unless from pots. Mallows, Choreopsis, China and German asters, French and African marigolds, Eutoca viscida, Nolana prostrata, &c., will be better raised on a hot-bed. New annuals are continually produced; we do not however consider them generally as a desirable class of flowers.

There are two methods of arranging flowers with a view to their display—1st, putting each species in a separate bed; 2nd, mixing two or more species in one bed. Each has its merits, and in every garden both should be practised. Flowers for the most part like a rich, light, new soil. The spot chosen for a flower-garden should be dry, open to the sun, and sheltered from wind and cold.

FLOWERS, ARTIFICIAL. The petals of flowers are imitated by ribbons, feathers, silkworm cocoons, cambric, taffeta, velvet, or thin laminæ of whalebone shaped and coloured for the

purpose. The stems are mostly formed of wires, wrapped round with paper, silk, or some other material of the required colour. The leaves and petals are mostly cut, and, if needful, embossed, by stamping with dies with sharp cutting edges, and are united together by means of wires and paste or cement. The modes of colouring are exceedingly various. Seeds and similar objects, and small fruits, such as currants, are beautifully imitated by wax, glass, or other compositions. Very beautiful imitations of plants are made with wax, rice-paper, and shells.

FLUCERINE, a deutofluate of cerium, which occurs both massive and crystallized. The crystals are either six-sided plates or prisms; they have a yellow or reddish colour.

FLUELLITE, a compound of fluoric acid and alumina, in colourless and transparent octahedral crystals.

FLUENTS. [Fluxions.]

FLUID, FLUIDITY, are terms applied to substances of which the parts possess perfect mobility amongst themselves. Fluids, or liquids, have been generally treated as incompressible bodies, but this is not strictly correct. The particles of a fluid being surrounded by others which are subject to external forces, such as that of gravity, undergo a pressure which is estimated by considering how great it would be if continued uniform over any surface taken as a unit. The direction of such a surface is immaterial, for the particle can only be in repose when the pressures from all quarters are equal. When fluids are inelastic, this pressure is entirely due to extraneous forces, such as the weight of the superincumbent mass. [Hydraulics; Hydrodynamics; Hydrostatics; Waves, &c.]

The term fluid has been extended to the supposed media through which the forces of electricity, galvanism, and magnetism act; but little that can be relied upon has been deduced from their supposed analogy with material fluids.

All ponderable matter exists either in the gaseous, fluid, or solid state; and most solids, when heat is applied to them, may be rendered fluid, or converted into liquids, under which circumstances mutual repulsion of particles takes the place of cohesion. As most solid bodies may be rendered fluid by heat, so many gaseous and fluid bodies are converted into solids by diminishing their temperature. Solid bodies in becoming fluid render latent a large quantity of heat; and, on the other hand, fluid bodies in becoming solid evolve much sensible heat. [Heat.]

FLUIDS, ELASTIC. This name may be applied to all the fluids in nature, since all are in certain degrees elastic; but it belongs particularly to such as are aeriform, liquid substances possessing the property of elasticity in a very low degree. Among the aeriform fluids, however, those which are usually considered as permanently elastic are called gases; and the term elastic fluid is frequently confined to atmospherical air and the vapours which are produced from solids or liquids by the action of heat. Many of the gases, on being combined with one another and with other substances, form solids or liquids: thus, oxygen gas unites with metals and becomes solid; ammoniacal gas and muriatic gas unite and form the solid called muriate of ammonia; while oxygen and hydrogen gas unite to form water.

Almost all gases are invisible; but several which are so when they exist alone, become visible on being mixed with one another. Thus, deutoxide of azote being mixed with atmospherical air or with nitrous acid, the combination becomes visible and of a red colour. All elastic fluids are transparent, but different quantities of light are absorbed in passing through those of different kinds, and, when the thickness of a stratum of fluid is considerable, the absorption is so great as to render an object beyond it invisible.

The elastic forces of a dry gas at a given temperature are inversely proportional to the volumes they occupy; and this law holds good also both for mixtures of elastic vapours with each other, and of vapours with gases, provided no chemical action takes place between them. Thus, different fluids of equal temperatures and equal elastic forces being introduced together in a close vessel whose capacity is equal to the sum of the volumes of the fluids separately, the fluids for a time remain separately in equilibrio; but experience shows, that gradually the fluids intermingle with one another, producing a homogeneous fluid, preserving the same temperature and elastic force.

The temperatures at which liquids become elastic fluids by the action of caloric are very various: muriatic and nitric æthers boil, under the usual pressure of the atmosphere, at about 70° (Fahr.); sulphuric æther boils at 98°, and acetic æther at 160°; water boils at 212°, while mercury can be made to boil only at a temperature of 670°. [Gas; Vapour.]

FLUOBORIC ACID GAS, or *Fluoride of Boron*, a colourless gas, which has a pungent odour, is deleterious to animals, and extinguishes flame. When bubbles escape into the air, they combine with its moisture, and produce a very white dense fume. It combines with bases to form salts called *fluoborates*. Its atomic constitution is fluorine 1, boron 2; and its specific gravity is about 2.33.

FLUOR SPAR, *Fluor*, *Fluate of Lime*, is a fluoride of Calcium, composed of fluorine 1, calcium 1. The primary form of the crystal is a cube: it assumes a vast number of secondary forms, as the octahedron, rhombic dodecahedron, &c. It occurs colourless, and of almost every colour, as gray, purple, black, brown, red, yellow, green, and blue: in Derbyshire the last is the prevailing tint, and the massive fluor of that county is termed by the miners Blue John. It is frequently transparent, but more commonly only translucent. The massive varieties are nodular or amorphous. The blue and variegated fluor spar of Derbyshire is turned into various ornamental forms, candlesticks, &c.; that of Cornwall is used as a flux in the reduction of copper ore.

FLUORIC ACID. [Hydrofluoric Acid.]

FLUORINE, a gas of a yellowish brown colour; its odour resembles that of a mixture of chlorine and burnt sugar, and, like chlorine, it has the power of destroying colour; it does not act upon glass. Like chlorine and oxygen, it appears

Patent Office Library
Received 12 Jan 1861
Section
Shelf
U.D.C. No.
Date;

to have a powerful affinity for metallic bodies and for hydrogen: with this latter it forms hydrofluoric acid.

The compounds which contain fluorine, when they do not possess acid properties, are termed *fluorides*. The combining equivalent is 18.74.

FLUOSILICIC ACID is a colourless gas. Its odour is peculiar, suffocating, and acid, and it fumes on coming into contact with the moisture of the air. It suffers no change by exposure to a high temperature. It is decomposed by water, of which it also decomposes a portion, and the results are hydrofluoric acid and silica. It consists of fluorine 1, silicon 1; and its specific gravity is about 3.6.

FLUSHING (*Vlissingen*), a town and fortified port on the south coast of the Island of Walcheren, in the Dutch province of Zeeland. The port is formed by two moles; and beyond these are two canals which enter the town, in the interior of which they form two secure basins fit to receive the largest ships of war. The batteries by which the port is defended command the south entrance to the Schelde. The town is well built, and the population is above 7000. It was besieged in 1809 by the English under Lord Chatham, and was taken, but evacuated very shortly after.

FLUTE, a well-known musical instrument, the use of which, under different forms and names, may be traced to the remotest periods of antiquity. The ancient flute had some sort of mouthpiece; it was double as well as single—that is, was often composed of two tubes, both played together. The old English flute was not unfrequently called the Flute à Bec; it had a mouth-piece, and was held in the manner of the clarionet. It had seven finger-holes, and no keys. The Flute à Bec was gradually superseded by that now in use, the German Flute. This, at first simple in construction, in length about a foot and a half, and having only one key, has by degrees been extended to twenty-seven inches, and has sometimes as many as a dozen keys, and frequently six; so that every kind of music within its compass, and adapted to the nature of a tube, may now be executed on this instrument. It is formed of any kind of hard wood, of ivory, and even of glass. The middle tones of the flute are the finest.

The *Octave Flute* is a small instrument an octave higher than the common flute. The best of these are provided with four keys.

FLUTE-STOP, on the organ, is a range of wooden pipes, tuned in unison with the diapason, It generally produces a very successful imitation of the instrument whence its name is derived.

FLUX, in chemistry and metallurgy, is any substance employed to assist the reduction of ores or metallic compounds to their metallic state. Limestone is employed as a flux for clay-iron ore, and fluor spar for copper ore. The alkaline substance called Black Flux is doubly useful in smelting ores; the carbonate of potash combines with the earthy parts of the ore; while the charcoal unites with the oxygen of the metallic oxides, and, carbonic acid being formed and expelled, the metal is reduced and melts. White Flux, or carbonate of potash, disintegrates stony matter, as alumina and silicia, separates acids and sulphur from metals, and dissolves many metallic oxides. Argol, or bitartrate of potash, is much used as a flux. Charcoal, glass, wax, tar, pitch, fat, oil, gum, sugar, and starch, are all occasionally employed for this purpose.

FLUXIONS, FLUENTS, *Method, Notation, and early History.* The method of fluxions assumes a distinct conception of velocity both in the case of a uniform and a variable motion. It further extends this notion of velocity or rate of increase, derived from the consideration of a moving point, to all species of magnitudes, and even to expressions which are purely numerical, as the formulæ of algebra. If one magnitude depend on another for its value, so that a change in the first produces a change in the second, and if the first be imagined to increase at a uniform and given rate, then the second will also increase or decrease, but not always at a uniform rate. But the rate at which y increases, though varying with the values of x, can in all cases be determined; and, supposing $\dot{x}$ to be the velocity with which x increases, and $\dot{y}$ that of y, an equation can always be produced of the form

$$\dot{y} = \left\{\begin{array}{l}\text{a function of } x \text{ and } y, \text{ depending on} \\ \text{the equation which connects them}\end{array}\right\} \times \dot{x}.$$

In this case x and y were called by Newton *flowing* quantities, and $\dot{x}$ and $\dot{y}$ were called their *fluxions:* conversely y and x were called the *fluents* of $\dot{y}$ and $\dot{x}$. The velocity of y, being variable, may itself be considered as having a rate of change. Thus, if the velocity of a body increase uniformly, the whole velocity gained in a second may be called the velocity of the velocity, or the fluxion of the fluxion. Newton denoted these second fluxions by $\ddot{y}$ and $\ddot{x}$. In a similar way might be determined the velocity of $\ddot{y}$, denoted by $\dddot{y}$, and so on. We cannot find that Newton proposed any symbol for the fluent of a fluxion except the inclosure of its expression, and that only casually: thus,

$$\boxed{3x^2\dot{x}} \text{ is the fluent of } 3x^2\dot{x}, \text{ or } x^3.$$

He also, in his treatise 'De Quadratura Curvarum,' used z' to stand for the fluent of z.

We now come to the history of this discovery, and of the dispute relative to the right of invention.

The biographers of Newton state, that about the year 1663 he began to turn his attention to the writings of Descartes and Wallis, and Newton himself testifies that he invented the method of series and fluxions in the year 1665; and that in a tract written in 1666 he had begun to use the notation of fluxions. In 1669 Barrow communicated to Collins a tract of Newton, which contains a method of series, and many problems solved by application of limits to differences obtained by expansion; but no direct method of fluxions. It was first published in the 'Commercium Epistolicum.' Various letters of Newton, Collins, and

others, up to the beginning of 1676, state that Newton had invented a method by which tangents could be drawn, &c., without the necessity of freeing their equations from irrational terms. Among them is a letter of Newton to Collins, dated December 10, 1672, in which he states the fact of his discovery, with one example. This letter the committee of the Royal Society assert to have been sent to Leibnitz, but without proof. Their original report does not even give the date of transmission; but an asserted date is surreptitiously introduced into the second edition of it, after the death of Leibnitz. Leibnitz desired to have this method communicated to him; and Newton, at the request of Oldenburg and Collins, wrote to Oldenburg the celebrated letters of June 13 and October 24, 1676. In the first he states the binomial theorem, and various consequences of it in combination with his method, but without giving any information as to that method. Leibnitz, in a reply also addressed to Oldenburg, speaks in the highest terms of what Newton had sent, and requests further explanation. Newton, in the second letter just mentioned, then explained how he arrived at the binomial theorem, and gives various results of his method. He also communicated his method of fluxions and fluents *in transposed letters* (as was often practised at the time). Thus Newton gravely tells Oldenburg that his method of drawing tangents was

6 *a c c d* æ 13 *e f f* 7 *i* 3 *l* 9 *n* 4 *o* 4 *q r r* 4 *s* 9 *t* 12 *v x*;

or, that if any one could arrange six *a* s, two *c* s, one *d*, &c., into a certain sentence, he would see the method. That sentence was, Data Æquatione quotcunque fluentes quantitates involvente fluxiones invenire, et vice versa. This letter of October 24, 1676, had not been sent to Leibnitz, March 5, 1677, as Collins informs Newton by letter of that date. So early as June 21 of the same year, however, Leibnitz had received that letter, and written an answer to Collins, in which, without any desire of concealment, he explains the principle, notation, and use of his differential calculus: this letter was published in the 'Commercium Epistolicum.' It is of this correspondence that Newton wrote the celebrated scholium, fully admitting the independent discovery of Leibnitz; of which, as we shall see, he was afterwards weak enough, first, to deny the plain and obvious meaning, and, secondly, to omit it entirely from the third edition of the 'Principia.'

Nothing material passed till 1684, in which year Leibnitz gave his first paper on the Differential Calculus in the Leipzig Acts. In 1687 the 'Principia' was published by Newton; and Leibnitz continued to give papers on the subject of his new Calculus. The Bernoullis began to cultivate the subject about the year 1691, and, as they were on terms of correspondence with Leibnitz, he was the source from whence they drew, and to which they returned, additional ideas on the subject. The Marquis de L'Hôpital was employed in writing his elementary treatise (the first written), which was published in 1696. All these considered Leibnitz as their chief; and the consequence was, that Dr. Wallis informs Newton, by letter of

April 10, 1695, that 'he had heard that his notions of fluxions passed in Holland with great applause by the name of Leibnitz's Calculus Differentialis.' Accordingly Wallis, who had just completed printing the first volume of his works (the third, which contains Newton's letters to Oldenburg, having been previously printed), inserted in the preface, as a reason for not mentioning the Differential Calculus, that it was Newton's method of fluxions which had been communicated to Leibnitz in the Oldenburg Letters. A review of Wallis's works, in the 'Acta Eruditorum, or Leipzig Acts,' for 1696, reminds the reader of Newton's own admission above mentioned.

In 1699 Fatio de Duillier, a Genevese, settled in England, stated in a mathematical work his conviction that Newton was the first inventor, adding that he left to those who had seen the manuscripts and letters to say whether Leibnitz borrowed from Newton. This was the first distinctly expressed suspicion of plagiarism; and Leibnitz, who had never contested the priority of Newton's discovery, and who appeared to be quite satisfied by Newton's admission, now appears, for the first time, in the controversy. In a reply to Duillier (Leipzig Acts, 1700) after calling attention to Newton's scholium, he declares that, when he published his method, in 1684, he knew nothing more of any method of Newton, except that the latter had written to him that he could dispense with the removal of irrational terms: and that, though on the publication of the 'Principia' he became aware how much further its author had pushed his discoveries, he did not know that Newton possessed a *Calculus* (or organized method) like the Differential, till the publication of Wallis's preface.

The 'Quadrature of Curves' was published by Newton in 1704 at the end of his 'Optics.' It contains a formal exposition (the first published) of the method and notation of fluxions. Since so great a stress was laid by the parties to the quarrel on the introduction of specific notation, we may remark that Newton himself did not very soon adopt such a course. He says that in 1666 he 'sometimes used a letter with one prick for quantities involving first fluxions; and the same quantity with two pricks for quantities involving second fluxions.' Even so late as 1687 he does not (in the 'Principia') give any notation for the *momenta* to which he had given a name, and we doubt whether Newton would ever have systematized his notation if he had not seen the letter of Leibnitz referred to in the scholium.

A review of the above work appeared in the 'Leipzig Acts,' January 1705, in which, after stating that the Differential Calculus had been explained in that work by Leibnitz, its inventor, and further by the Bernoullis and De L'Hôpital, the author proceeds to imply, to all appearance, that Newton had used the method of Leibnitz. This called forth the assertion of Keill ('Phil. Trans.,' 1708), that Leibnitz had inserted Newton's method, changing its name and notation, in the Leipzig Acts.

Leibnitz, on the receipt of this volume (March 1711), complained of the accusation in a letter to

Dr. Sloane (then secretary of the Royal Society). After some correspondence, the Royal Society appointed a committee, which collected and reported upon a large mass of documents, consisting mostly of letters from and to Newton, Leibnitz, Oldenburg, Wallis, Collins, &c., &c. The committee consisted of Halley, Jones, De Moivre, Machin, Brook Taylor, Robarts, Hill, Burnet, Aston, Arbuthnot, and Bonet. From many circumstances (see the Life of Newton in Knight's 'British Worthies') it is clear that this committee was, and was meant to be, one of advocates, not of judges. Their report was to the effect that Leibnitz was in London at the beginning of the year 1673, from which time to September 1676 (when he visited London before returning to Hanover), he was in correspondence with Collins and Oldenburg: that, when first in London, he was in possession of a differential method, which was no other than that of Mouton: and that he never mentioned any other till he wrote a letter of June 1677, being a year after a copy of Newton's letter to Oldenburg, of December 10, 1672, had been sent to Paris to be communicated to him, and four years after Collins began to communicate the contents of that letter. Also, that by a former letter of Newton, of June 1676, it appeared that he had been in possession of his Fluxions five years before: that Leibnitz's method is in fact the same as that of Newton, with a difference of name and notation: finally, that Newton being the first inventor, Keill, in asserting the same, had been no ways injurious to Leibnitz. This report, preceded by a large mass of letters or extracts, appeared in the year 1712, under the name of 'Commercium Epistolicum,' and again with a Recensio, &c. prefixed, in 1722. Some copies have a title-page of 1725. This edition has some clandestine alterations, which are pointed out in the 'Philosophical Magazine' for June 1848. One of them we have had occasion to allude to.

Leibnitz only protested in private letters against the injustice of the proceeding: he declared that he would not answer a reasoning so weak; and it appears moreover that he had on his mind an impression that the acrimony excited against him in England was political. He was in the service of the Elector of Hanover, the health of the queen was declining, and many of the men of science were Jacobites.

With regard to the 'Commercium Epistolicum,' and the Report attached, it is obvious that the final conclusion was not to the point. The question was, not whether Newton was the first inventor, but whether Leibnitz had stolen the method, as he had been accused of doing.

The 'Commercium Epistolicum' (which was not published for sale, the few copies printed being distributed as presents) did not reach Leibnitz, who was at Vienna, for a considerable time. In the meanwhile he wrote to John Bernoulli (who had received his copy) for his opinion of the work. This the latter gave, first in a letter to Leibnitz, and afterwards (as Leibnitz asserts) in an anonymous sheet published in July 1713. But, as in this tract the author speaks in complimentary terms of John Bernoulli, it has been supposed that at least it was edited by some one else. This letter is decidedly as unfair towards Newton as the friends of the latter had been towards Leibnitz: it asserts the method of fluxions to be a plagiarism from the Differential Calculus. Keill printed a reply, and Newton and Leibnitz then appear as mutual accusers, in letters to Mr. Chamberlayne. Nothing remarkable arose out of this correspondence, which terminated in the announcement of Leibnitz, that he also would prepare a 'Commercium Epistolicum.' About December 1715, Leibnitz reopened the matter in a letter to the Abbé Antonio Conti of Venice, then on a visit to England. He there complains of the treatment he had received, and attacks the Newtonian philosophy in general. Newton wrote a reply, February 26, 1715–16, in which he very much dwells on previous admissions made by Leibnitz. The latter, in a third letter to Conti, April 9, 1716, avows that he always believed Newton upon his word, but that, seeing him connive at accusations which he must have known to be false, it was natural that he (Leibnitz) should begin to doubt. Newton is also reminded that he had made some admissions in favour of Leibnitz (in the scholium) which he was now desirous of disavowing. This letter was not sent directly to Conti, but first to Paris, that it might be there seen and copied by a friend: on which, Newton refused to send any answer, considering it as an insult that Leibnitz, though he complained of suppressions in the 'Commercium Epistolicum,' should take means to preserve evidence to the whole of his letters. But Newton circulated some remarks among his friends, which he published immediately on hearing of the death of Leibnitz, November 14, 1716. It is in these remarks that he tries to explain away the meaning of his own scholium in a very singular manner. Both the scholium and the explanation are quoted in the 'Penny Cyclopædia,' article 'Fluxions.' Raphson's 'History of Fluxions' being then ready for publication (its title-page bears 1715), the Conti correspondence was annexed as a supplement.

The time is not yet come at which the Royal Society is willing to repair the wrongs inflicted under its name upon Leibnitz. Two papers were recently presented, within two years of each other. The *first* pointed out a mistake of historians as to the members of the committee which published the 'Commercium Epistolicum,' by which mistake Newton might have been thought to have asserted a falsehood. It also relieved the Society from the charge of having formed an unfair bench of judges, by showing that those who had been taken for judges were counsel. The *second* pointed out the clandestine additions made to the 'Commercium Epistolicum' in the second edition, and exposed the manner in which they were meant to prejudice Leibnitz. The Society printed the *first* paper in the 'Philosophical Transactions,' and buried the *second* in its archives. (See the statement made by Mr. De Morgan, the writer of these papers, 'Phil. Mag.' June 1848.)

FLY, a name applied almost indiscriminately to all insects possessing wings, but by many entomologists restricted to the various species of

terous insects, an account of which is given under the head DIPTERA.

FLY-TRAP. [DIONÆA.]

FLY-WHEEL. [WHEELS.]

FLYING BRIDGE. This consists usually of a boat or other vessel, which, being attached by a rope to a buoy moored in the middle of a river, is made by the action of the current to move across on an arc of a circle of which the buoy is the centre. On large rivers, at places where the communications across them are very frequent, such bridges will probably, in future, be superseded by steam-vessels; but for temporary purposes, and particularly to facilitate military operations in countries where steam navigation is not in use, they may be of the highest importance.

The buoy being securely anchored in the middle of the river, a rope or chain leads from thence to the mast of the boat, which is at a distance from the head equal to one-third of the vessel's length; then, the keel of the boat being kept at a certain angle with the direction of the current, a resolved part of the pressure of the water against one side of the boat will cause the latter to describe an arc of a circle across the river. In theory, the angle which the keel should make with the direction of the current, in order that the force by which the boat is impelled across may be a maximum, is 54° 44′.

In a rapid current it may be impossible to make the boat move up the ascending arc of its path; in which case a boat near one bank may, by means of a cable made fast at a point directly opposite on the other bank, be allowed to describe a descending arc quite across the river. In order to return, the boat must first be drawn up along the bank at which it has arrived, as far as the spot at which the cable was made fast, and then be hauled directly across the river to the spot from whence it first set out.

When the river is too wide for a boat to swing over in a single arc, two buoys may be moored in a direction across the river, at equal distances from the banks and from each other, and two boats connected with them by ropes may be impelled in circular arcs, one extending over the first half of the breadth of the river, and the other over the second: a raft being moored in the middle facilitates the transference of the passengers, &c., from one boat to the other; or, without the raft, one boat, on arriving in the middle of the river, may transfer its passengers immediately to that which is to describe the other half of the breadth.

A triangular raft having its front parallel to the direction of the current, and being connected by a ring with a rope stretched tightly across the river, may by a resolved force of the current be impelled directly to the opposite bank; and, on reversing its position, the raft may be impelled across in a contrary direction. A boat running by a ring at one end, on a rope, may, by being kept in an oblique position, in like manner be *sheered* across the river.

On broad rivers, and when objects of great bulk and weight, as horses, carriages, or artillery, are to be conveyed across, two boats or barges placed in parallel positions, and carrying a platform extending between their exterior gunwales, are employed. Each vessel is provided with a mast, which may be from 20 to 30 feet in height; these are connected together by two horizontal beams, one above the other, and between them is a block of wood which is capable of sliding from one mast to the other. The cable or chain is made to pass through a perforation in the sliding piece, and the latter is placed contiguously to either mast, according to the direction in which the vessels are to move.

(Douglas, *On Military Bridges, &c.*)

FLYING-FISH. Under the head DACTYLOPTERUS there is an account of certain flying-fishes belonging to the order *Acanthopterygii:* there are however others, of a different tribe, which have the same appellation, being equally gifted with the power of sustaining themselves in the air for a certain length of time—we allude to the species of the genus *Exocetus.*

The genus *Exocetus* belongs to the *Abdominal Malacopterygii,* and forms part of the family *Esocidæ.* The distinguishing characters are:—pectoral fins nearly equal to the body in length; head flattened above and on the sides; the lower part of the body furnished with a longitudinal series of carinated scales on each side; dorsal fin placed above the anal; eyes large; jaws furnished with small pointed teeth.

FO, pronounced by the Chinese Fŭh, is the name by which Buddha is worshipped in China. According to the Chinese authorities quoted in Dr. Morrison's 'Chinese Dictionary' (vol. i. part i. pp. 92, 93), the religion of Fo was introduced into China in the seventh year of the reign of the Emperor Ming, about A.D. 50. Though the Chinese government has usually discountenanced, and at some periods persecuted, the followers of Fo, they have always been very numerous; yet Mr. Davis remarks, in his work on the Chinese (vol. ii. p. 94), that 'the present condition in China of the religion of Fŏ is very far from flourishing; and the extensive and magnificent establishments which have been founded in former times are evidently in a state of dilapidation and decay. It is rarely that one meets with any of their nine or seven-storied pagodas in tolerable repair, though one or two of these striking and elegant objects occur in almost every landscape. Between Macao and Canton there are no less than four or five nine-storied pagodas on elevated points by the river-side, and every one of them is in a state of ruin.' Many interesting particulars respecting the Buddhist religion in China are contained in *The Catechism of the Shamans; or, the Laws and Regulations of the Priesthood of Buddha in China. Translated from the Chinese Original, with Notes and Illustrations by* C. F. Neumann, London, 8vo., 1831. [BUDDHA.]

FOCUS (Optics), the point at or near which rays are collected by a lens or mirror. Its distance from the lens or mirror is called the focal length.

FO'DIA, a genus of mollusks established by Bosc, and generally arranged by zoologists at the end of the Simple Ascidians, and next to *Bipapillaria;* nor is it better known than the last-named genus. Animal oval, mammillated, divided

throughout its length, by a vertical partition which contains the stomach, into two unequal tubes, opening at each extremity by an orifice, the upper one being a little sunk and irregularly dentated, and the lower edged by a circular border forming a kind of sucker, and serving to fix the animal. Bosc founded the genus from a mollusk found on the coasts of North America.

FŒNI'CULUM, the genus to which the common pot-herb called Fennel belongs. In this country we are acquainted with but one sort of fennel, the *Fœniculum vulgare*, a biennial plant with leaves cut into hair-like segments, yellow flowers, and glaucous stems, common on chalky cliffs in the southern parts of England, and generally cultivated for the sake of the aromatic quality of its leaves. There are several other species.

FŒTUS, a Latin word applied to the immature young of any animals. This term is used in physiology to designate the embryo of mammiferous animals, and particularly of man. There has been considerable confusion in the application of the names fœtus and embryo: the newly developed germ has been called the embryo during the first six weeks of utero-gestation, or pregnancy, and then during the rest of its uterine life has been denominated the fœtus; but this distinction is entirely arbitrary. The word embryo is applied to the immature being, developed in the ovum of any animal after impregnation, and before it is capable of supporting an independent existence, and therefore is equally applicable to oviparous and viviparous animals: it has a much more extensive signification than fœtus, which is restricted to the embryo of viviparous animals only, in which the ovum after impregnation descends from the ovary into a peculiar cavity denominated the uterus, where it becomes attached to the mother, and derives its nourishment from her till it is sufficiently perfect to exist separately. In oviparous animals, on the contrary, the germ when detached from the ovary is conveyed through a tube called the oviduct, and excluded from the body of the mother, without being again connected with her, or deriving any nourishment from her.

The ovulum of mammalia after impregnation bursts from the ovary, and is conveyed through the Fallopian Tube to the uterus, but it has not been exactly determined how soon it arrives there.

The ovum at first contains no embryo visible to the naked eye; in fact, it may be considered as now proved, by the labours of Wolff and other physiologists, that the organs of the fœtus are successively formed in the ovum, and not evolved, according to ancient hypothesis, from parts pre-existing in the germ. The ovulum grows rapidly after reaching the uterus; it at first consists of two sacs, one inclosing the other, and the inner containing a liquid. When it is about half a line in diameter, a new element becomes visible in it; a round, opaque, granular disk is seen, with a dark spot in its centre, upon the surface of the internal globule or sac. This spot, which is seen either on or through the inner membrane of the ovum, corresponds with the cicatricula of the egg, and is the first rudiment of the fœtus.

The original structure of the ovum, and the early development of the embryo, in mammalia, appear to be much the same as in the egg of a bird; though there are some characteristic differences. When a human ovum of any magnitude is examined, the embryo is seen suspended in a loose bag filled with fluid, called the amnios, which is a shut sac: this sac is the outermost product of the serous layer of the germinal membrane. For its formation a membrane is reflected from the sides and extremities of the embryo (the reflection, according to Velpeau, not commencing before the twelfth day), so as to inclose a space behind it. As the walls of the trunk close in front, the circle at which the amnios is attached to the body of the embryo gradually contracts, till at length it is limited to the edge of the umbilical opening; it then invests the umbilical cord, and spreads out from its placental extremity into an ample sac filled with fluid, in which the fœtus floats. The mucous layer of the germinal membrane in mammalia is supposed from analogy to form a sac, as in birds, containing a yolk, or substance subservient to the nourishment of the fœtus in its early stage.

In man, after impregnation has taken place, a spongy membrane is formed on the inner surface of the uterus by an exudation of lymph. This membrane, called decidua, lines the whole of the uterus before the descent of the ovum; but when this passes down through the Fallopian Tube it gradually pushes the deciduous membrane before it, inverting one portion of it which surrounds the ovum, and is called the 'decidua reflexa;' this grows with the ovum till it fills the cavity of the uterus, and comes in contact with the other portion called the 'decidua vera,' lining the walls of the uterus. The point at which the decidua is reflected upon the ovum is where the placenta is fixed in the uterus. This organ is a spongy vascular mass like a cake, from six to eight inches in diameter, about an inch thick in the middle, and two or three lines at the circumference. It adheres by one surface to the uterus, and by the other is connected with the fœtus by means of the umbilical cord. The uterine surface is lobulated, and is connected with the uterus by blood-vessels. The fœtal surface is covered by the chorion and amnios, and presents the ramifications of the umbilical vessels, which consist of two arteries and a vein. The radicles of these vessels communicate with each other, but no communication has ever been shown to exist between them and the utero-placentine vessels; for if we inject from the umbilical arteries we find that the placenta is rendered turgid, and that vessels are found filled in every part of it, but between their ramifications there will remain an uninjected substance, and the uterine surface will not be injected, for the fœtal vessels do not pass all the way to that surface. In like manner, if we inject from the uterine vessels, the placenta will be rendered turgid, but nothing passes into the fœtal vessels. From this circumstance it is concluded that the placenta consists uniformly of two portions: the one is furnished by the deciduous coat of the uterus, the other by the vessels of the chorion, and these two portions may, during the first three months, be separated from each other by maceration.

The navel-string, or umbilical cord, which connects the child to the mother, is composed of the umbilical vein and two umbilical arteries twisted together, and surrounded by a gelatinous substance and the reflections of the chorion and amnios: it also contains the urachus, and the remains of the duct of the vesicula alba and omphalo-mesenteric vessels.

When the human fœtus is first distinctly visible through the membranes, it is not above a line in length, and of an oblong shape. At the end of about six weeks it is slightly curved, and somewhat resembles a split pea; at the conclusion of the second month it may be compared in size and shape to a kidney bean. The extremities begin to shoot out like the buds of a plant in the sixth week; the arms are at first large in proportion to the legs; in fact, the limbs are originally very much alike, and only distinguishable by their situation; they at first grow straight out from the trunk.

At an early period of fœtal existence there is no brain, but only the spinal marrow, so that the embryo of man then resembles one of the lowest orders of animals; the brain is perceptible about the second month, and is evidently formed by a prolongation of the spinal cord. Before the sixth month the brain is semifluid. Hair does not grow on the head before the sixth month, and even then it is very short, thin, and light-coloured. The nails are at that period indistinct, the eye-lids closed, and the pupil is filled up by a membrane. In the seventh month the membrana pupillaris is removed, the eye-lids open, the nails become more distinct, and the hair longer and thicker. At the full time the nails are quite formed, the hair covers the head, and is of its proper colour, the cells of the skin are filled with fat, the lungs are large and red, the valve of the foramen ovale completely formed, the ductus arteriosus nearly an inch in length, and almost as large as the aorta itself.

The fœtus has many peculiarities which distinguish it from the child after birth. The most characteristic difference is that it lives in a medium of water, and not of air, and consequently does not breath by lungs, but has the blood which is deteriorated by circulating through the system purified in some manner in passing through the placenta. The umbilical vein carries the blood from the placenta to the fœtus: it enters the liver by the longitudinal fissure, and in the transverse fissure communicates with the vena portæ, sending the greater part of the blood to be circulated in the liver. The rest of the blood is transmitted directly to the vena cava inferior by the ductus venosus, which seems to be a continuation of the umbilical vein in man, though in most animals it is merely a branch arising from the sinus of the vena portæ. The blood conveyed by the vena cava inferior to the right auricle of the heart does not all pass, as in the adult, into the right ventricle, but a great portion goes immediately into the left auricle through an opening in the septum of the auricles called the foramen ovale, which closes up immediately after birth. The blood that still goes into the right ventricle through the auriculo-ventricular orifice is propelled into the pulmonary artery; but, as there is no use for it at present in the lungs, it nearly all passes through a vessel named the ductus arteriosus into the aorta. This duct also becomes obliterated after birth, its functions having ceased when once the child has breathed.

By the aorta the blood is sent from the left side of the heart and ductus arteriosus to the different parts of the body, from which it is returned by the veins, but a great part of it passes out of the body of the fœtus by the umbilical arteries which are continued from the internal iliacs, and pass out at the navel to go to the placenta. The blood of the fœtus differs in its physical and chemical qualities from that of the adult. There is before birth no distinction between arterial and venous blood; it is of a dark colour in both systems of vessels. The purified blood is brought from the placenta by the umbilical vein, and is mixed before arriving at the heart with that which has been circulating through the fœtus; the mixed blood is then transmitted by the aorta to various parts of the body, some of it only going again to the placenta by the umbilical arteries, to be again purified.

The position of the child in the uterus is that which takes up the least room; it lies with the head downwards, the chin being bent on the breast; the knees are doubled up close to the belly, and the arms are folded in the space between the head and legs.

The ordinary period of utero-gestation in man is forty weeks, though labour often takes place before this period, or is delayed a little beyond it.

FŒTUS, in Botany. [EMBRYO.]

FOG. [MIST.]

FOGGIA. [CAPITANATA.]

FOGO. [CAPE VERDS.]

FÖHR. [SCHLESWIG.]

FOHR, CARL PHILIPP, a young landscape painter of very great ability, was born at Heidelberg in 1795. In 1816 he visited Rome, and painted two pictures there which ranked him among the first painters of his class, and procured him the patronage of the present king of Bavaria. Fohr was drowned in the Tiber while bathing, June 29, 1818.

FOIX. [ARIE'GE.]

FOIX, GASTON III., COUNT DE, Viscount de Béarn, was born in 1331. He was the son of Gaston II. by Eleanor, daughter of Bernard V. Count de Cominges. His father died when he was twelve years old, leaving him under the guardianship of his mother. In the course of his varied and somewhat turbulent career, we find him in 1345 making his first essay in arms against the English in Guienne; in 1349 marrying Agnes, daughter of Philip III., king of Navarre; in 1356 arrested by the French king, John, on suspicion of criminal intelligence with his brother-in-law Charles the Bad; then, on his release, serving in succession against the infidels in Prussia, against the Jacquerie in Meaux, and against the Count d'Armagnac, his personal enemy, in Béarn, whom he took prisoner. In 1380 Gaston took arms against Charles VI. for removing him from the government of Languedoc, and only yielded on negotiation.

In 1373 he parted from his wife, and in 1382 killed his only son. This youth, in 1382, paying a visit to his mother, who had retired to the court of her brother, Charles the Bad, received from that king (to whom crime was familiar) what he pretended was a bag of love-powder, which that king told him to conceal, at the same time informing him that the sprinkling of a small quantity of it upon any food his father might eat would have the effect of reconciling the count to his wife. The powder turned out to be a strong poison, and Gaston ordered his son to be arrested. The young prince, deceived but not guilty, refused all nourishment, and died in his prison. Gaston died of apoplexy in 1391. He left Charles VI. heir to his domains. His favourite passion was hunting. He carried it to such extreme, that, if we may believe Saint Yon, he did not keep fewer than sixteen hundred dogs. He also composed a work on the subject, three or four editions of which are known. It was in the castle of Orthes, Gaston's principal residence, that Froissart, who stayed there a considerable time, heard many of the best stories with which his history is embellished. The portrait which he has drawn of Gaston is one of the completest pictures of what a chivalrous prince was in the time of our Edward the Third.

FOKIAN. [China.]

FOKZANY. [Moldavia.]

FOLA'RD, JEAN CHARLES DE, was born at Avignon, in 1669. He entered early into the army, and distinguished himself by the attention which he paid to the scientific part of his profession, to the movements and manœuvres of an army in the field. Having been made aide-de-camp to the Duke of Vendome, he attended him in his Italian campaigns. He afterwards served in Flanders under the Duke of Bourgogne. Finally he was in the service of Charles XII. of Sweden, who employed him on some missions, and whom he accompanied in his last expedition to Norway. After Charles's death Folard returned to France, and made a short campaign in the war against Spain of 1719, after which he occupied himself in writing on military matters. He died at Avignon in 1752.

Folard's principal work is his 'Commentaries on Polybius,' in which he not only makes his observations on the events narrated by the Greek historian, but also draws parallels between ancient and modern military practices, and reasons on the occurrences of the wars which he had witnessed, exposing with the greatest freedom the errors of the various commanders of his own age. Folard's 'Commentaries' were published in 6 vols. 4to., Paris, 1727-30, and again at Amsterdam, in 7 vols. 4to.: the seventh volume contains some treatises and strictures on Folard's system of tactics, with his own replies.

FOLCLAND. [Bocland.]

FOLDVAR. [Tolna.]

FO'LIO, from the Latin *folium*, properly signifies a leaf, and in books of accounts means a leaf, or two pages, of a ledger-book. Folio *a* and *b*, or *recto* and *verso*, are ancient and still continued distinctions for the first and second sides of the leaf or folio, in manuscripts and early printed books. Folio, with booksellers, means a book in folio, the pages of which consist of sheets folded only in two, each leaf making half a sheet.

FOLKES MARTIN, an ancient English antiquary, was born October 29, 1690. He entered Clare Hall, Cambridge, in 1707, and made such great progress in all branches of learning, and especially mathematics and philosophy, that at the age of 23 he was admitted a fellow of the Royal Society, and two years later was chosen a member of the council. In 1723, the president, Sir Isaac Newton, appointed him one of his vice-presidents; and in 1733 he was similarly honoured by Newton's successor, Sir Hans Sloane. In 1741 Sir Hans resigned the presidency, and Mr. Folkes was unanimously elected in his place. Other honours naturally attended such a career. He succeeded Dr. Halley as a member of the Royal Academy of Sciences at Paris. From each of the two great universities of Cambridge and Oxford he received the degree of LL.D. Of the Society of Antiquaries he was successively fellow, vice-president, and lastly, in 1750, president. After this he did not long enjoy his well-earned and multifarious honours; he was struck with palsy, languished in a sad condition for nearly 3 years, and died on the 28th of June, 1754. He left two daughters by his wife Lucretia Bradshaw, whom he married from the stage. The sale of his books, prints, coins, &c. lasted 56 days. A monument to his memory was erected in Westminster Abbey in 1792. Among the subjects that engaged his attention may be mentioned—his first paper (contributed to the 'Philosophical Transactions') on the Aurora Borealis, Observations on the Trajan and Antonine pillars at Rome, and his writings on coins and coinage. During a tour with his family in Italy, in 1733-4-5 he examined many of the best furnished cabinets of that country, and prepared his excellent 'Dissertation on the Weights and Value of Ancient Coins.' He left incomplete a 'Table of English Silver Coins,' which was afterwards carried on by Dr. A. Gifford, and published by the Society of Antiquaries.

FOLKESTONE. [Kent.]

FOLK-MOTE, or FOLK-GEMOTE, literally a meeting of the people; an assembly under the Anglo-Saxon government, respecting the nature of which some of our antiquaries have differed. Somner, in his 'Anglo-Saxon Dictionary,' calls it a general assembly of the people for considering and ordering matters of the Commonwealth. The laws of King Edward the Confessor expressly direct that the meeting of the Folkmote should be held once in the year upon the 1st of May.

FOMENTATIONS are liquid applications, generally of a warm temperature, placed in contact with a limited portion of the body, to mitigate or remove disease of the part, or of the neighbouring organs. Flannel cloths, or other substances fit to retain heat and moisture, are commonly applied. To enable these substances to retain the heat still longer, they are often covered externally with oiled silk. It is proper to renew the application before the cloths begin to give a feeling of coldness.

FONDI. [Lavoro, Terra di.]

FONT, a vessel employed in Protestant churches to hold water for the purpose of baptism, and in Catholic churches used also for holy water. The form of the font is usually hexagonal, similar to the form of the baptistery, in which fonts were originally placed.

Fonts also occur both of a circular and square form. They are usually shaped like a cup, with a solid stem, or supported on columns; the top is hollowed out for the water, and the sides and stem are often highly enriched with ornaments, sculptured figures, and with colour and gilding. In many instances a flight of steps forms a base, and even the sides of these steps are carved with pannels, having quatrefoils and rosettes sunk within them. It was usual to cover the basin of the font with a wooden lid, and there are some of these remaining of a pyramidal or spire-like form, richly carved and designed, with a profusion of shafts, buttresses, and tracery piled up to the apex.

Among the fonts especially worthy of note may be mentioned those of—Porchester Church, which is like the circular stone mouth of the well in the atrium of a Roman house; of Lincoln Cathedral, which is square, on five columns, one being in the centre; of Lowestoff in Suffolk, and Loddor in Norfolk, both remarkable for their richness of decoration; of Winchester Cathedral, very curious and ancient; and of East Dereham, in Norfolk, of which a representation is given below.

Font in East Dereham Church, Norfolk.

FONT. [Baptism.]

FONTAINE, JEAN DE LA, was born in 1621 at Château-Thierry, where his father was Maître des Eaux et des Forêts. He began early to distinguish himself in literature, and a translation by him of Terence's 'Eunuch' was published by him in 1654. On the death of his father he succeeded to his office, and took a wife, with whom he lived unhappily, and from whom he finally separated. In fact, he was of too indolent and improvident a disposition for any of the common avocations of the world. Some verses of La Fontaine happening to fall in the way of the exiled Duchess de Bouillon, who was residing at Château-Thierry, she caused the author to be introduced to her, and took him with her to Paris when she returned. Here the superintendent Fouquet became his Mæcenas, and placed his name on a list of pensions which he allowed to various persons of merit. On the exile of this minister, La Fontaine wrote a pathetic elegy. Though many distinguished persons honoured him with their patronage, his ignorance of the world and his habitual carelessness would have plunged him into difficulties had not a liberal lady, Madame Sablière, taken him into her house, where he resided for twenty years in perfect tranquillity. In 1684 he was received into the Académie, as successor to Colbert, Boileau being the rival and unsuccessful candidate. On the death of his benefactress, La Fontaine was again reduced to difficulties, and would have been forced to accept an offer of St. Evremond to take him to England, had not the Duke of Burgundy assisted him. Afterwards, in his old age, M. d'Hervart kindly offered him an asylum in his house. He died in 1695.

The works by which La Fontaine is known are his 'Tales' and his 'Fables.' The former have a very equivocal set of readers, and are seldom mentioned in society; the latter belong to that small class of works the reputation of which never fades, and which are just as well known at present as they were in the 17th century. La Fontaine never or rarely invented his subjects: his tales are taken from Boccaccio, Machiavelli, Ariosto, and others; his fables are chiefly selected from Æsop.

FONTAINE-L'EVEQUE. [Hainault.]

FONTAINEBLEAU, a town in the French department of Seine-et-Marne, stands in 48° 22′ N. lat., 2° 38′ E. long., 36 miles S. by E. from Paris, and has 8439 inhabitants. It is situated in the midst of the forest of Fontainebleau, and well built, with handsome, wide and straight streets. The town has a college, two fine cavalry barracks, and several other remarkable edifices, among which are the Château d'Eau, containing a reservoir fed by a spring, the waters of which supply the different fountains and basins of the royal palace; the hospitals founded by Anne of Austria and Madame Montespan; the public baths and library. Near the south entrance to the town there is an obelisk, erected in 1786 to commemorate the birth of the children of Queen Marie Antoinette. The palace, is an irregular pile, resembling a group of distinct edifices rather than one united building. It has six court-yards, each of which is nearly or quite surrounded with buildings. This famous palace may be said to owe its origin to François I., though a royal residence had existed here since 1141. The works left incomplete by François were

continued till the time of Louis XIV., in whose reign the whole was completed. After the first revolution it was occupied by the military school afterwards transferred to St. Cyr, and continued in a state of neglect and disrepair till it was completely restored by Napoleon to its original splendour and destination as a royal residence. From his downfall the palace was neglected and almost forgotten till after 1830, when it was restored by the munificence of the ex-king Louis Philippe.

The palace of Fontainebleau has been the scene of several remarkable events. It was the residence of Christina of Sweden in 1657, and here she caused Monaldeschi to be murdered; the revocation of the Edict of Nantes was signed here, in 1685; and here, in the following year, the great Condé died. The table at which Napoleon signed his abdication in 1814 is still shown in a salon of the Cour Ovale.

The park and gardens are in a style of magnificence corresponding to that of the palace: they are adorned with a canal and cascade (nearly three quarters of a mile long, and above 120 feet wide), with several smaller canals, a variety of jets d'eau, and with statues in bronze and marble. An attempt to assassinate Louis Philippe, king of the French, was made in this park by Lecomte, on the 16th of April, 1846.

The forest of Fontainebleau contains 40,620 acres, or nearly 64 square miles; it surrounds on nearly every side the plain in which the town stands: its surface is unequal, and its soil sandy, interspersed with blocks of granite, which are quarried for the pavement of Paris. It is pierced by a great number of fine avenues, and presents much picturesque beauty. The forest contains a great quantity of game; wild boars are numerous. (*Dictionnaire de la France.*)

FONTA'NA, PROSPERO, a celebrated painter, was born at Bologna in 1512. He was a pupil of Innocenzio da Imola, the assistant of Vasari, and the master of the Caracci, and was in the highest reputation in Bologna till the establishment of the school of the Caracci. In portrait he was one of the best painters of his time. In fresco, of which there are specimens by him at Bologna, at Rome, and at Città di Castello, he was a mere machinist. He was employed as a portrait painter by Giulio III. and his successors. He died at Rome in 1597. His daughter, Lavinia Fontana, called also Zappi, the name of her husband, was a skilful painter, especially in portrait. She died at Rome in 1614, aged 62.

FONTA'NA, DOMENI'CO, a distinguished Italian architect, was born on the borders of the Lake of Como, in 1543. Having joined his elder brother, Giovanni Fontana, at Rome, he there attracted the notice of Cardinal Montalto, who confided to him the erection of the Capella del Presepio in Santa Maria Maggiore, a design of great nobleness and grandeur, but overloaded with ornament. He built also for the cardinal the Villa Negroni. The pope, taking advantage of all this display of wealth on the part of the cardinal, suppressed his pensions, when Fontana contributed a thousand scudi of his own towards the expenses of the Capella. This act, no doubt, endeared him to the cardinal, who was able to repay it richly on his being elected to the pontifical throne, under the name of Sisto Quinto. Sixtus was very desirous to re-erect the various Egyptian obelisks that lay neglected among the ruins of ancient Rome, and especially to remove the one then standing in the Vatican Circus to the area in front of St. Peter's. This was above 83 feet high, and the ablest mathematicians and engineers were summoned to suggest the means. Among the 500 projects submitted, Fontana's was ultimately adopted with entire success. A very interesting account of all the circumstances were published by Fontana. He removed other obelisks subsequently, and one of a still larger size (above 105 feet high), with the same satisfactory result. ('Egyptian Antiquities,' in 'Library of Entertaining Knowledge.') Honour and distincion, with a pension of 2000 scudi, were Fontana's reward. To the successes of the engineer followed the successes of the architect. Fontana had the charge of the Lateran Church, to which he made a new kind of portico, and immediately adjoining he built the Palace of the Lateran, &c. He constructed the Vatican Library, and in so doing destroyed the noble court formed by Bramante. [Bramante.] The Quirinal, another papal residence, was partly erected by him, and the two colossal figures that stand before it were placed there by him, after their removal from the Baths of Constantine. He restored the columns of Trajan and Antoninus, and the fountain of Termini. He was preparing to erect a vast cloth manufactory within the Coliseum, which would of course have irreparably ruined the sublime character of that antique pile, when Sixtus died, and with him the idea he had originated. The next pope, Clement VIII., dismissed Fontana from the office of papal architect, when he was immediately invited to Naples by the viceroy, Count de Miranda, for whom he erected a royal palace and other works. He died at Naples, in 1607.

FONTARABIA, or FUENTERABIA. [Basque Provinces.]

FONTENAY-LE-COMTE. [Vendee.]

FONTENAY-SOUS-BOIS. [Seine.]

FONTENELLE, BERNARD LE BOVIER DE, born at Rouen, Feb. 11, 1657, was by his mother's side nephew of the great Corneille. He was educated at the College of the Jesuits in his native city. Here the law was the study to which his attention was nominally directed. But his heart was not with it; poetry, philosophy, science, and history engrossed his time. Having completed the term of his legal studies, he lost the first cause in which he was retained, and thereupon, abandoning for ever the distasteful profession of the law, devoted himself to the more attractive and congenial pursuits of literature, and obtained from them both honour and profit.

For the last years of his life he was in the enjoyment of a yearly income of nearly 900*l*., and left behind him at his death a very considerable sum. From 1699 to 1741 he held the distinguished and responsible office of secretary to the Academy of Sciences at Paris. Fontenelle died at Paris on the 9th January, 1757, having com-

pleted his hundredth year within a few weeks, and expired exclaiming, 'Je ne souffre pas, mes amis; mais je sens une certaine difficulté d'être.' The calmness with which he met his death was in keeping with the serenity of his whole life, which presented a rare instance of self-command and moderation, neither confounding virtue with austerity, nor pleasure with excess.

Fontenelle's poetical works occasionally display much delicacy of sentiment, and extreme polish and elegance both in the thought and diction; but generally the poetic feeling is weak, and there is little invention, and a decided want of originality and force. 'Ismène' and the 'Apologie de l'Amour' however are likely to live.

The 'Dialogue des Morts,' published in 1683, first laid the foundation of his literary fame, which was firmly established by the appearance two years afterwards of the 'Entrétiens sur la Pluralité des Mondes,' one of the ablest of his works, and exhibiting a rare combination of science and wit. The object of the latter was to familiarize his countrymen with the Cartesian astronomy. In the 'Éloges,' which, as secretary of the Academy, he pronounced upon its deceased members, he combines history and encomium with such tact and delicacy, that the panegyric is almost imperceptible, and the commendation the highest when apparently least intended.

His other chief works are the 'Histoire des Oracles,' the 'Géométrie de l'Infini,' and the 'Apologie des Tourbillons.'

The great influence and reputation which he enjoyed in his lifetime were the result of his possession of unequalled social qualities, and of the brilliancy and universality of his acquirements, by which he was able to enact at once the man of fashion and the man of letters. By his wonderful skill in adapting himself to the capacity of others, he was able to improve and embellish the lightest conversation with scientific and moral allusions; and, by applying the language of ordinary life to the most abstruse topics and ideas, he contributed greatly to transfer the tribunal of letters from the scholarly few to a large and miscellaneous class of readers, and, by this revolution, to favour and to advance a spirit of scientific research in the seventeenth century.

The works of Fontenelle were collected and published in 8 vols. 8vo., Paris, 1760.

FONTENOY. [HAINAULT.]

FONTEVRAULT. [MAINE-ET-LOIRE.]

FOOD. All organized bodies are nourished by the introduction into their internal structures of materials from without. Such materials are called indifferently aliments or food, and are fitted to supply and maintain the fluid and solid matter of the body. For this purpose they must either be soluble naturally, or capable of being dissolved by the digestive principle of the stomach. However diversified the articles employed may be in external appearance or chemical composition, they are reduced by the action of the organs of digestion into a fluid (chyle) of homogeneous character, which is reconverted into solids and fluids of different natures by the influence of the powers of assimilation. [DIGESTION.]

Although man derives his food from both the vegetable and animal kingdoms, it is found that the animals which are consumed by man derive their nourishment from the vegetable kingdom, so that plants are the true source of all the food both of man and the lower animals. The principal constituents of the human body as well as all other animal bodies are the organic elements, carbon, hydrogen, oxygen, and nitrogen, and it is the waste of these substances which is constantly going on that it is the object of food to supply. Plants however do not supply the animal with carbon, hydrogen, oxygen, and nitrogen, in a simple form, but as secretions of the vegetable tissues known to chemists under the names of gluten, fibrine, albumen, casein, &c. The plant itself does not derive its food from the organic elements in a pure form, but combined with each other: thus, carbonic acid gas, consisting of carbon and oxygen, water, composed of oxygen and hydrogen, and ammonia, of hydrogen and nitrogen, are the great sources of vegetable nutrition, and consequently of the various secretions used as the food of man and animals. Not only do these secretions serve to build up the fabric of the human body, and to supply the daily waste of tissue which is going on, but they also supply materials for keeping up animal heat within the system. The temperature of the human body in health is 98° Fahrenheit, and those products which contain carbon, if used as food, assist in maintaining it.

The secretions of plants which thus serve to supply heat to the system differ materially from those which support the fabric and strength of the body. The former possess carbon, hydrogen, and oxygen, but no nitrogen, and are therefore distinguished as carbonaceous, respiratory, or combustible secretions. The latter contain nitrogen, and are called nitrogenous or nutritious secretions.

Dr. Lankester, in his 'Lectures on the Food of Man,' proposes the following arrangement of the various substances entering into the diet of man.

I. Alimentary Secretions.

A. Nitrogenous or Nutritious Secretions.

Forms of Protein.

Vegetable Albumen	Animal Albumen
——— Fibrine	——— Fibrine
——— Casein	——— Casein.

B. Carbonaceous, Respiratory, or Combustible Secretions.

Cellulose	Sugar—Alcohol
Starch	Oil of Fat.

II. Medicinal Secretions.

A. Organic Acids.

Citric Acid	Malic Acid
Tartaric Acid	Oxalic Acid.

B. Volatile Oils.

Cinnamon	Pepper
Cloves	Mustard.
Nutmeg	

C. Alkaloids.

Theine	Tea, Coffee, Paraguay Tea	Theobromine	Chocolate and Cocoa.

The nitrogenous secretions are formed abundantly in the various parts of plants used as food by man and animals. They are all modifications of a principle called *Protein*, which is the basis of the substances called albumen, fibrine, and casein.

Albumen is found in many parts of animals, and exists in many vegetables, such as the cauliflower, turnips, mangel wurzel, &c., the juice of which, when boiled, yields a coagulum exactly the same in its chemical composition as the white of eggs, which is familiary known to consist of albumen. Albumen is soluble in water, but when submitted to the action of heat it coagulates, and is not again soluble in water.

Fibrine enters more largely into the fabric of the human body than albumen. It is found in the blood, and in the juices of plants in a dissolved form. It exists in the muscles of animals, in fruits, seeds, &c., in a coagulated form. Fibrine is not soluble in water, and coagulates spontaneously. The substance in plants called *gluten*, which abounds in wheat, barley, and oats, is identical with fibrine.

Casein exists in the milk of all animals, and is the substance that is separated from it in the preparation of cheese. It is found abundantly in some vegetables, and especially in the seeds of the leguminosæ, as peas, beans, lentils, &c. It may be distinguished from albumen by its not coagulating under the influence of heat, and by its being precipitated by all weak acids, and dissolved in them again by an excess of acid. The second class of secretions, the carbonaceous, have been well known to chemists for a length of time. They consist principally of starch, sugar, and oil.

Starch is found largely in the tissues of almost all plants in the form of irregularly shaped little granules. It is separated from some plants, and used extensively as an article of diet under the names of tapioca, arrow-root, sago, &c.

Sugar is found in the sap of many plants, and is separated for the purposes of diet from those in which it abounds, such as the sugar-cane, beet-root, sugar-maple, grape, &c. It exists largely too in the milk of animals, and has a composition resembling starch, being however more easily digestible, and therefore better adapted for the food of young animals. Both this secretion and the former have a tendency to create fat in the body by a change in their chemical composition after they enter the system. This fact should be observed, for persons frequently mistake a diet, which causes them to grow fat without increasing the strength of the body, for one that is contributing to the general nourishment of the tissues.

Oils are of two kinds—fixed and volatile. The former only enter, in any great degree, into the food of man; the latter are found to constitute the peculiar smells and tastes of various plants. In consequence of the large quantity of hydrogen contained in oil, in addition to carbon, it is a more inflammable body than either sugar or starch, and is therefore more capable of keeping up the animal heat, and forms a large proportion of the diet of persons inhabiting cold climates.

The flesh of animals, that is, the muscles, nerves, &c., are formed out of the nitrogenous secretions of plants; and it will be seen that it is by feeding on the flesh of other animals that these can be most easily procured. Man derives the principal source of his nourishment from other animals, which in their turn have appropriated from the vegetable world the substances which enter into their tissues.

The Medicinal Secretions form rather an occasional than an habitual article of consumption amongst men. They do not contribute to the performance of any of the great functions of life, but appear to be of service in preventing or alleviating disease. Such are our various spices which contain volatile oils, and the alkaloids contained in tea, coffee, chocolate, &c.

The artificial wants of man have suggested many varieties of food which may at first appear not to yield any of these secretions. On examination however, they will be found to belong to one or other of the classes named, and to exercise an influence on the system accordingly. There is however one exception to the general fact that the food of man and other animals is derived from the vegetable world, which will be seen in the consumption of salt, *chloride of sodium*, as an article of diet. This substance seems to be necessary to the proper performance of the functions of the human body, and is not unfrequently sought for by other animals. It is probably the source from which is obtained the chlorine which enters into the composition of the hydrochloric acid existing in the gastric juice, which is secreted by the mucous membrane of the stomach during digestion.

FOOLS, FEAST OF. This was a festival anciently celebrated in different churches and monasteries of France upon New Year's Day, from a very early period, when every kind of absurdity, and even indecency, was committed. It is supposed to have originated in the Roman Saturnalia.

FOOL'S PARSLEY. [ÆTHUSA.]

FOOT. [SKELETON.]

FOOT. [WEIGHTS AND MEASURES.]

FOOT-BALL, a ball made of a blown bladder cased with leather, to be kicked by the foot. This was an early and favourite sport with the English. Fitzstephen mentions it among the games of the Londoners in the time of Henry II. It is still a favourite game, especially in the north of England and in Scotland.

FOOT-PRINTS, impressions of the feet of reptiles (as of *Cheirotherium*) and birds (*Ornithichnites*), are now become recognised evidence of the existence of particular races of organic beings, in certain geological periods, though no other traces of them remain. By this evidence, the air-breathing vertebrata appear to be of higher antiquity than was formerly supposed, and to date from the upper parts of the carboniferous system.

FOOTPATH. [WAYS.]

FOOTE, SAMUEL, was born at Truro, in Cornwall, but the date of his birth is not exactly known. He was educated at Worcester College, Oxford, and on leaving the university he began to study the law, but soon grew tired of it. He married a lady of fortune; but the match proved an unhappy one, and he became a dissipated man. To redeem his fortune he tried the stage, at first

in tragedy, but afterwards in comedy and farce. His wants however outran his power of satisfying them; and to relieve himself he aided Sir Francis Delaval to marry a rich lady, who was induced to accept the ruined baronet by the persuasion of a conjuror—a friend of Foote's. For this Foote received in return an annuity. It was not until Foote became a manager that he became well known as an admirable farce writer, and a very able comedian. He opened the little theatre in the Haymarket in 1747, and subsequently obtained a patent through the accident of his breaking his leg while riding with the Duke of York. His death is said to have been hastened by his trial for a charge of the worst nature, although he was honourably acquitted. He was seized with paralysis while engaged on the stage, and died in 1777. The most popular of Foote's farces have been the 'Mayor of Garratt,' and the 'Liar.' Generally his plays were dramatic satires levelled at the manners and persons of his time, and therefore have little stage interest now.

FORAMINIFERA, an order established by M. D'Orbigny for certain foraminated polythalamous internal shells which have no chamber beyond their last partition. They have no siphuncle; but their chambers are supposed to communicate with each other by means of many small foramina. This order is placed by M. D'Orbigny as the third of the *Cephalopoda;* but M. Dujardin has made observations on the living animals of some of the species which induce him to assign these testaceous forms to a new class of animals inferior in their organisation to the *Radiata*, and endowed with locomotive power by the instrumentality of minute tentacular filaments. For this class he proposes the name *Rhizopoda*. The species found in the European ocean are comparatively few, and their size is very small; but the Adriatic abounds both in genera and species which are larger. The greater number are microscopic. M. D'Orbigny has divided his *Foraminifera* into five families, and has prepared magnified models, which are to be found in most collections, illustrating 100 species and all the 52 genera.

FORAMINIFERA, FOSSIL. The expectations of naturalists and microscopists, from Lamarck to Ehrenberg, that in the composition of the stratified crust of the globe minute organised bodies have had a more important share than the bones of Vertebrata and the shells of Mollusca, appear to be fully justified by recent discoveries in the Cainozoic and some of the Mesozoic strata. In most countries the superficial marls and silts which are associated with peat are found to be full of the silicious shields of Infusoria; some of the tertiary sands are loaded with the calcareous shells of Foraminifera, and this group has been distinctly traced downwards into the chalk, the oolite, and mountain limestone, and probably even into the Silurian rocks. These Foraminifera diminish in number as we pass below the chalk: perhaps also they recede more from the forms of existing minute Polythalamacea, but this is a point requiring much further investigation. The most abundant forms in the chalk belong to a few groups entitled Rotalia, Spirolina, and Textilaria. In the oolites and mountain limestone the forms generally resemble those of Textilaria.

The relation of the fossil Foraminifera to the recent types is perhaps closer than that of most other tribes. It appears not only that several tertiary forms are identical with living species, but further, according to Ehrenberg, that no less than nine or ten Foraminifera of the chalk are undistinguishable from existing species.

Some idea of the myriads which now occur together in particular localities in a fossil state, and once swarmed in life throughout the ancient seas, may be gained from the following passage in Dr. Buckland's 'Bridgewater Treatise,' descriptive of one genus only:—'*Nummulites* are so called from their resemblance to a piece of money; they vary in size from that of a crown-piece to microscopic littleness, and occupy an important place in the history of fossil shells, on account of the prodigious extent to which they are accumulated in the later members of the secondary and in many of the tertiary strata. They are often piled on each other nearly in as close contact as the grains in a heap of corn. In this state they form a considerable portion of the entire bulk of many extensive mountains, as in the tertiary limestones of Verona and Monte Bolca, and in secondary strata of the cretaceous formation in the Alps, Carpathians, and Pyrenees. Some of the pyramids and the sphinx of Egypt are composed of limestone loaded with nummulites. It is impossible to see such mountain masses of the remains of a single family of shells thus added to the solid materials of the globe without recollecting that each individual shell was once connected with the body of a living animal, and thus recalling our imagination to those distant epochs when the waters of the ocean which then covered Europe were filled with floating swarms of these extinct mollusks, thick as the countless myriads of *Berõe* and *Clio Borealis* that now crowd the waters of the polar seas. Lamarck, in his observations on *Miliola*, remarks, that these very minute animals have had much more influence on the masses which compose the surface or exterior crust of our globe than the remains of elephants, hippopotami, and whales.'

FORBES, WILLIAM, bishop of Edinburgh, was born at Aberdeen in 1580. As one of the ministers of Edinburgh, he preached before Charles I. on his visit to Scotland in 1633, and the eloquence he then exhibited is said to have induced the king to resolve that he should be the first bishop of Edinburgh. He died on the 11th of April, 1634. His fame is chiefly traditional. His only published work embodied a proposal for an accommodation between the Protestant Episcopal Church and the Church of Rome, which was likely to have made episcopacy more unpopular in Scotland than it was.

FORBES, PATRICK, bishop of Aberdeen, was born soon after the middle of the sixteenth century. He became bishop of Aberdeen in 1618, and died in 1635. He was the author of several polemical works, which were collectively published in Latin at Amsterdam, in 1646. A curious collection of funeral sermons on his memory, was published soon after his death.

FORBES, JOHN, a divine and polemical writer, second son of Patrick Forbes, bishop of Aberdeen, was born in 1593. He lived during the period of the hottest struggles for supremacy between Episcopacy and Presbyterianism, and exhibited in his writings the views of toleration and ecclesiastical peace that appear to have distinguished his family. He was one of the Aberdeen doctors, who maintained a controversy with the Covenanters, and was in the end deprived of his benefice by the latter in 1640. He lost with it part of his own private property that he had attached to the professorship he held. He died in 1648.

FORBES, DUNCAN, chiefly remembered for his exertions in repressing the Scottish rebellion of 1715 and 1745, was born in 1685, and educated for the law. When the first rebellion broke out, he was sheriff of Mid-Lothian; in which office he behaved with so much courage and address, that the comparative tranquillity of the north of Scotland was mainly secured by his and his brother's exertions. Subsequently, as deputy lord advocate (equivalent to our Solicitor-General), he no less honourably distinguished himself for humanity and delicacy of feeling in the prosecution of the persons who had been taken prisoners for their share in the insurrection. When the second rebellion broke out in 1745, Forbes fortunately held the high post of Lord President of the Court of Session, and was therefore able to act with the greatest possible vigour against them. In consequence the rebels were kept in check until the government was able to bring an adequate military force into the field. He was rewarded by the ministry with the most contemptuous neglect, and by the absolute refusal to compensate him for his individual losses in the public service. He died Dec. 10, 1747.

President Forbes was a man of great learning, and of varied accomplishments. He is stated to have perused the Old Testament eight times in the original Hebrew. He was the author of some elegant verses. His patriotic spirit and general enlightenment of mind were shown by his unwearied exertions to promote the welfare of his country in its trade, manufactures, agriculture, fisheries, roads, &c.

FORBES, JAMES (born 1749, died 1819) was a civil servant of the East India Company, who made himself creditably known by his 'Oriental Memoirs' (1813), which, through the beauty and spirit of its coloured plates of plants and animals, its amusing anecdotes, and its interesting information on the history, manners, and customs of Hindustan, obtained a wide popularity.

FORBIN, CLAUDE (born 1656, died 1734), was one of the most distinguished naval officers of France, and the chief actor in many noticeable exploits against the English, Dutch, Venetian, and the Barbary powers. His 'Memoirs,' published during his lifetime, in 1730, are exceedingly interesting.

FORCALQUIER. [ALPES, BASSES.]

FORCE, a term which is employed to denote the unknown cause of any mechanical effect. Thus the cause of motion and the cause of pressure are both forces: again, difference of effects must be attributed to difference in the producing causes: thus, greater or less velocity, and greater or less pressure, are both attributed to differences in the causes of velocity or pressure. But, on the other hand, effects which are the same in one point of view may differ in another; thus, bodies of different weights, let fall from the same heights above the ground, will strike the ground with the same velocities, but with different degrees of effect upon the substance which they strike. Again, if a ball be thrown upwards with a velocity a, which carries it to a height b, it will, when thrown upwards with twice the velocity, ascend through four times the height b.

In the theory of equilibrium, force is a synonyme of pressure, and weight is its measure. In this definition time is not one of the elements; but it is easily seen that, wherever pressure is produced, motion is prevented; if, for example, a string by which a weight is suspended be suddenly cut, the weight will descend. It is also proved that, if a certain rate of motion be communicated to matter, the matter will preserve that motion unaltered till some external cause interferes. On this axiom the notion of force, as causing motion, depends for precision; the *alteration of velocity* is the evidence of the existence of force.

When force, in the sense of pressure, is considered as the cause of motion, we must take into account both the element *time*, and also the quantity of matter which is moved. The connection of pressure, velocity created by pressure, and time which pressure takes to create velocity, as deduced from experiment, are contained in the following results:—

1. The same pressure continually acting upon a given mass for different times produces velocities which are proportional to the times, and augments velocity by equal portions in equal times.

2. The same pressure applied to different masses of matter (that is, to different weights of matter) during the same time, produces velocities which are inversely proportional to those masses.

3. The velocity of falling bodies is accelerated by 32.19 feet in every second: and in that proportion for all other times.

In different masses the pressures necessary to destroy motion in a given time are as the products of the masses and velocities. Thus, the pressure which will in one-hundredth of a second reduce to rest a mass of 10 ounces moving 100 feet per second, is to the pressure which will (also in one-hundredth of a second) reduce to rest 20 ounces moving 85 feet per second, as 10×100 to 20×85, or as 1000 to 1700. It is customary to call this product of mass and velocity the *momentum* or *moving force* of the body.

When bodies are in motion, with a continually varying velocity, it becomes desirable to consider their motion, not with reference to the masses which are moved, but solely to the alterations of velocity which are produced; and it is customary to ascertain the amount of velocity which would be produced in one second if the acceleration at the point in question continued uni-

formly. [Acceleration.] This result is called the *accelerating force*, and it is found by the rules of the Differential Calculus in the following manner. [Velocity.] If a point move in a line in such a manner that x feet is its distance from a given point in the line at the end of the time t seconds, and if x be a function of t, then the velocity of the body (v) at the end of the time t is $\frac{d\,x}{d\,t}$ feet per second, and the acceleration which that velocity is then undergoing is such as, if allowed to continue uniformly for one second, would increase the velocity by $\frac{d\,v}{d\,t}$ or $\frac{d^2x}{d\,t^2}$ feet.

If f represent this accelerating force, we have then

$$v = \frac{d\,x}{d\,t}; f = \frac{d\,v}{d\,t} = \frac{d^2\,x}{d\,t^2}; v\,d\,v = f\,d\,x.$$

These are called the *equations of motion.*

From what precedes it may be shown that accelerating forces are proportional directly to the pressures which produce them, and inversely to the masses in which they are produced.

FORCELLINI. [Facciolati.]

FORCES, IMPRESSED AND EFFECTIVE. When various pressures act at different points of a system, the forces which act upon any one point are not those which would by themselves produce the motion which that point really has, in consequence of the motion of the system. Thus, suppose a pendulum with two balls, one above and the other (which suppose much heavier) below the point of suspension. The forces which act on the upper ball would, if it were free of the larger one, cause it to descend; while, in consequence of the connection of the two balls, the smaller actually does vibrate like a pendulum turned upside down, or as if its gravitating tendency were upwards instead of downwards. Here is an instance in which the impressed force acts downwards and the *effective* force upwards; that is, the motion which actually ensues is such as would require a force acting upwards to cause it.

One of the most important principles in dynamics is that known by the name of D'Alembert, and is enunciated thus: the impressed forces are altogether equivalent to the effective forces, or, if the directions of the latter were all changed, the former would equilibrate them. [Virtual Velocities.]

FORCES, PARALLELOGRAM OF. Any two forces acting at the same point, and represented in magnitude and direction by two straight lines, are equivalent to a third force which is represented in magnitude and direction by the diagonal of the parallelogram constructed with the two lines as its sides. [Composition.] This theorem is frequently called that of the *parallelogram of forces.*

FORCING, in Horticulture, is the art of hastening the growth and maturity of flowers, fruits, and vegetables, by artificial means.

Many of our finest exotic fruits are indigenous to warmer countries, and would scarcely ripen even in our warmest seasons; but by this art they are brought to great perfection in cold climates; and, by advancing or retarding artificially the growing season of hardy kinds, they also can be had in regular succession throughout the greater part of the year.

The fruits of warmer climates, growing in a wild state, enjoy a greater degree of light than it is possible to give them in this country at any season of the year, and this is one of the most important circumstances to attend to in the art of forcing. Nature is in all respects the best guide in these matters, and care should be taken to imitate her as far as possible; first, by taking care that forced plants are exposed to all the light that can be collected; and, secondly, by preserving a due proportion between the quantity of heat and light to which forced plants are exposed; in other words, by not forcing too hard at a season when the sun's rays are least powerful, thus acting in direct opposition to the laws of nature. Attention to this is the corner-stone of the whole process. When early crops are more desirable than high-flavoured fruit, gardeners are obliged to apply heat without reference to the intensity of light; but, if this is not the object, forcing should never be commenced before the spring, in order that the fruit may have the greatest degree of light when ripening. These principles are now generally understood and appreciated, and consequently our peaches, grapes, and other forced fruits are even superior to those grown under the clear skies of the south of Europe.

It appears to be a general rule that plants from warm countries endure with impunity a very high degree of temperature, while those of more temperate regions are impatient of artificial heat, and hence the difficulty of forcing the plants of northern climates; for example, the same degree of heat in which vines flourish would be much too high for cherries, which throw off their blossoms after expansion without setting their fruit. Extreme caution is therefore necessary in forcing the fruits of northern climates. Firstly, the increase of temperature must be slow and gradual, and never at its highest point exceed 60° or 65° of Fahr. with artificial heat; air must be freely introduced, particularly in fine bright weather, and the house so constructed as to admit of the greatest possible quantity of light, as, for instance, having moveable lights which can be taken off and put on at pleasure.

The Dutch have long been celebrated as excellent forcing gardeners; and, as their manner of performing the operation is peculiar, a description of it may be interesting. The principal feature in their system is conducting the operation chiefly in frames and pits heated with fermenting dung. The trees employed in forcing are generally taken from a wall in the open air, planted in a rich border of leaf mould, and trained to a trellis a few inches below the glass; here they remain until they have ripened their fruit, after which they are moved back to the wall until wanted for the same purpose in some succeeding year; they never force from the same plant two years in succession. Their system of employing dung instead of fire heat gives them an excellent oppor-

tunity of forcing vegetables, such as French beans, endive, lettuce, &c., which are either placed on, or plunged in, the bed in the inside of the frame.

FORD, a name applied to that part of a river where the water is sufficiently shallow to admit of wading through it, and thus crossing over without having recourse to a bridge, a ferry, or other similar means of passage.

Rivers whose banks are steep and course straight are rarely fordable, for in such the water is generally too deep or too rapid to admit of fording. Small and regular streams issuing from springs in flat countries are generally fordable at all times and in all parts. The most common cases however are those of temporary and changeable fords. Permanent fords, and such as are occasionally impassable, were used long before bridges were constructed, and as travellers from a distance sometimes, on arriving, were unable to cross the river, hostelries for their temporary reception were constructed on the banks. Such has been the beginning of many towns whose names still commemorate their origin, as Chelmsford, Bedford, Oxford, Stratford, &c.

Such rivers as flow through a loose soil, as sand or gravel, have generally a very winding course, and are almost constantly shifting their channel. Banks are at times carried away by floods, and others formed in parts that before were deep; so that often the place of the ford is changed.

In military operations fords are of the greatest importance. They are generally found either in the widest part of the river, or in the direction of the diagonal line that joins the salient angle of one side to the salient angle of the other side. In the first case the waters spread out in the wider part of the bed of the river, and are therefore less deep; and, in the second, there is always a deposit in front of the salient angle, and consequently the water is more shallow in those parts.

Fords for infantry should not exceed the depths of three feet, and for cavalry that of four feet. These are the extreme depths, and if the current be somewhat rapid it is dangerous to risk fording through more than two feet water for infantry and three for cavalry.

FORD, JOHN, the dramatist, descended from a highly respectable family in the north-west of Devonshire, was probably born in or a little before 1586, the known date of his baptism. In 1602 he entered at the Middle Temple, and four years after produced his first poem, an elegy on the death of the Earl of Devonshire.

Although he aided in the composition of plays, he did not appear as an independent writer till 1629, when he published 'The Lover's Melancholy,' which was followed four years afterwards by ''Tis Pity She's a Whore,' 'The Broken Heart,' and 'Love's Sacrifice.' The next year produced 'Perkin Warbeck;' and in 1638-39 he published two serious comedies, called 'The Fancies chaste and noble,' and 'The Lady's Trial.' Besides these, he wrote in conjunction with Decker 'The Sun's Darling,' a moral mask, which was not printed till 1657 according to Langbaine, or 1658 according to Gifford.

Ford's plays contain many fine thoughts, and numerous specimens of harmonious versification, apparently the result of considerable labour.

His best work is, we think, 'Perkin Warbeck.' It has an air of repose throughout which we do not see in Ford's other plays. The whole effect is very much like what is called Shakspere's second manner.

FORDUN, JOHN DE, the father of Scottish history, is believed to have been a canon of Aberdeen, and to have been born in the early part of the fourteenth century. He probably died in the year 1386. His History ('Joannis Fordun Scotichronicon,' Edinb., 1759, 2 vols. fol.), as far as completed by himself, is in five books, and comes down to the end of the reign of David I. (A.D. 1153). It begins at the creation; and the early part forms rather a treatise on cosmogony than a chronicle or history. He also left materials for bringing down the narrative to 1385, which were put in order by Walter Bower, abbot of Inchcolm, who continued the History to the death of James I., 1437. Fordun spent much time in collecting the materials for his History, both by inquiry and by travel, and appears to have made a diligent and honest use of all the sources of information that were accessible to him.

FORECLOSURE. [MORTGAGE.]

FORELAND, N. and S. [KENT.]

FOREMAN. [JURY.]

FORESHORTENING is a term chiefly applied to anatomical drawing when one or more limbs of a figure, or the entire body, are shown so as to be *shortened* by being viewed directly in front or nearly so, the spectator seeing little more than its *fore* end, or that which is towards him.

FOREST, an extensive tract of ground overgrown with trees and underwood. Trees, like other vegetables, require, according to their several natures, and independent of suitable soils, different modifications of heat, light, moisture, and atmospheric pressure; circumstances which, so far from being influenced by latitude alone, are much more dependent upon the height above the level of the sea, its vicinity, and other circumstances, than upon proximity to or distance from the equator. Humboldt states that, whether we ascend from the plain of Oratavia to the top of the Peak of Teneriffe, or from the shores of the Pacific to the summit of the Mexican Andes, we find different zones of vegetation, in which the succession of forest-trees follow, generally, the same order that is observed in passing over the surface of the earth from the equator towards the poles.

The British Isles, like other countries of Europe, were in former times much more abundantly covered with timber than they are at present. The increase of population tends to the destruction of forests by causing a demand for the productions of arable land. But, though we have now hardly any forests of considerable extent, there are perhaps few countries over which timber is more equably distributed. Woods of small extent, coppices, clumps, and clusters of trees are very generally distributed over the face of the country, which, together with the timber scattered in the hedge-rows, constitute a mass of wood of no inconsiderable importance. Scotland contains

forests in Aberdeenshire and Inverness-shire. Ireland is almost without forests.

In Norway the mountains are covered with wood; birch, maple, pine, and fir, forming immense forests. The fir, sometimes attaining a height of 160 feet, is in great estimation for masts and building timber. In the regions of moderate elevation are aspens. The good lands have some fine forests of oaks. The forests of Sweden are similar to those of Norway. In Denmark the existing forests cover but a small area. The timber of Holland consists of beech, fir, poplar, and ash; willow grows along the canals, and the coppices are of maple, ash, hornbeam, birch, and beech, with a slight portion of oak-bushes. In Germany the forests are estimated to cover about one-third of the whole surface, though some consider this estimate too large: they comprise most of the usual varieties of timber-trees.

Switzerland is abundantly wooded, particularly with the cone-bearing trees. Oaks are found occupying a region which rises to the height of 2800 feet above the sea, beyond which, and to the height of 4000 feet, there are beech woods; the firs are found at the height of 5500 feet. France has many fine forests, though hardly sufficient for the consumption of a country where wood is the chief combustible, and where the state of the arts and general civilization create a constant demand for large timber and wood of every kind. The variety of climate and position in that country are however favourable to the growth of all kinds of European and many exotic trees. The woods are pretty generally distributed over the country. Italy, Spain, and Portugal, are all rather deficient in forests. European Turkey has fine forests of oak, elm, pine, plum, apple, pear, cherry, apricot, maple, sycamore, walnut, chestnut, and beech trees.

Of all the countries of Europe, Russia is the most abundantly provided with timber; and her forests would be an almost inexhaustible source of wealth, if it were possible for the government effectually to protect them from destruction. In 1802 regulations for the preservation of the forests were established; but such is their extent and that of the country, that it is next to impossible wholly to prevent the waste of wood. There are 200,000,000 of acres exclusively covered with pine and other cone-bearing trees, without counting oaks, maples, beech, poplar, hornbeam, and birch. Poland is, for its size, nearly as well supplied with forests as Russia.

In Asia Minor, Mount Taurus is covered with forests of cypress, juniper, and savines. Oaks and fir abound in the forests along the Black Sea. Trees of all these kinds occur in the Caucasus. Persia has few forests, except amongst the mountains near the Caspian. Arabia has none. Central Asia is too little known to yield us much information respecting its forests. Siberia has some vast forests of the harder kinds of trees. China, Japan, and Corea, all possess immense forests in their more mountainous districts. India, both within and beyond the Ganges, is rich in wood. There are whole forests of the bamboo, which sometimes attain a height of 60 feet. Cocoa-nut and palms of all kinds cover large tracts. Here are woods of oak, fir, cypress, and poplar; there of mangoes, banyan-trees, uvarias, robinias, sandal-wood, &c. Nearly all the eastern islands seem to be tolerably rich in forests, Australia perhaps excepted.

In Africa there are some spots in which vegetation is rich beyond description. Thus Senegambia, Guinea, and Congo, are covered with forests, which consist of the baobab, of palms, robinias, sycamores, sandal-wood, tamarinds, bananas, oranges, limes, and pomegranates; there are also cocoa-nut trees in great abundance. The tamarind and cedar, which grow in the greatest profusion on the borders of the Congo, furnish timber of the finest quality. Abyssinia has abundant woods. The Atlas Mountains are covered with magnificent forests, producing a variety of oaks, the mastic tree, the cypress, &c. The kingdom of Bornou has immense forests, and the date-palm abounds there.

America is, of all parts of the world, the most thickly covered with wood. Beginning with the north, we find the Russian territory on the north-west coast abundantly stocked with fine timber: pines 300 feet high and 45 feet in circumference, Canadian poplar, alders 40 feet high below the branches, birch, yew, black and common oak, American ash, sycamore, sugar maple, cypresses 24 feet in circumference, and willows. Canada contains immense forests, as do most of the British North American territories. The United States are abundantly wooded, the cleared land even in some of the Atlantic states being inconsiderable when compared with that still covered with the primitive forests, which contain an immense variety of trees. There are about forty different kinds of oak, fourteen of pine, cedar, cypress, larch, several maples, birch, ash, beech, iron-wood, hornbeam, hickory, wild-cherry, and apple, mulberry, poplar, willow, magnolias, elm, chestnuts, &c. Oregon, Mexico, and Texas, have all splendid forests. The West India Islands are for the most part only moderately wooded. In South America the Caracas possesses inexhaustible forests; and so indeed do most of the South American states. The forest region of the river Amazon and of the upper Orinoco, according to Humboldt, covers an area of about 719,000 square miles.

From the above rapid sketch of the forest lands of the globe, it appears that they still cover a great portion of its surface, nor can it be doubted that the immense tracts of wood we have enumerated exercise a very powerful influence on the physical economy of the earth.

FOREST LAWS. There are no laws respecting the forests among the laws attributed to the Conqueror; but after the Norman Conquest the royal forests were guarded with much greater strictness; their number was extended, and possibly in some cases their bounds enlarged; trespassers upon them were punished with much greater severity; and, finally, there was established a new system of laws and of courts for their administration, by and according to which not only all offences touching the royal forests were tried, but also all persons living upon these properties were generally go-

verned. This is the system or code that is properly called the Forest Laws. Yet even of this code we have no complete record; our knowledge of it is derived from some incidental notices of the chroniclers; the vague though energetic languag of complaint and condemnation in which it is repeatedly spoken of; the various legislative enactments for its reform which have been preserved; and the remnants of it which survived to a comparatively recent period.

The Conqueror is said to have possessed in different parts of England 68 forests, 13 chases, and 781 parks. A forest is defined by Manwood, the great authority on the Forest Laws, as being 'a certain territory or circuit of woody grounds and pastures, known in its bounds, and privileged, for the peaceable being and abiding of wild beasts and fowls of forest, chase, and warren, to be under the king's protection for his princely delight; replenished with beasts of venery or chase, and great coverts of vert for succour of the said beasts; for preservation whereof there are particular laws, privileges, and officers belonging thereunto.' The beasts of park or chase, according to Coke, are properly the buck, the doe, the fox, the marten, and the roe; but the term in a wider sense comprehends all the beasts of the forest. Beasts of warren are such as hares, conies, and roes; fowls of warren, such as the partridge, quail, rail, pheasant, woodcock, mallard, heron, &c. He adds, 'beasts of forests be properly hart, hind, buck, hare, boar, and wolf; but legally all wild beasts of venery.' (Co. Litt. sec. 387.)

For the antiquity of the royal forests in England, 'the best and surest argument,' says Coke, (4 'Inst.' 319), 'is, that the forests in England, being sixty-nine in number, except the New Forest, in Hampshire, erected by William the Conqueror, and Hampton Court Forest, by Henry VIII., and by authority of parliament, are so ancient as no record or history doth make any mention of their history or beginning.' Yet it appears, both from the great charter of John and from a previous charter granted by Stephen, that some lands had been afforested (as the term was) after the time of the two first Norman kings.

The Carta de Foresta, a charter granted by Henry III. in the 9th year of his reign (A.D. 1224), was the first separate charter of forests. The subsequent legislation upon this subject is principally to be found in the following statutes:—The Customs and Assize of the Forest, or the Articles of Attachments of the Forest (of which the date is not known); the Ordinatio Forestæ of the 33 Edw. I. (1305); the Ordinatio Forestæ of the 34 Edw. I. (1306); the 1 Edw. III. c. 8 (1327); and the 7 Ric. 2. c. 3 (1383).

One of the chief things insisted upon, in the early national demand for the reform of the Forest Laws, was the mitigation of their severe code of punishments. The Conqueror, who, as the 'Saxon Chronicle' says, loved the red deer as if he had been their father, is affirmed to have visited the slaughter of one of these animals with a heavier penalty than the murder of a human being. And it would appear from the charter of Henry III. that the offence had previously been punishable, not only with mutilation, but with death.

The Forest Laws were administered by their own officers and courts. The officers were the justices in eyre of the forest; the wardens or warders; the verderers, foresters, agisters, regarders, keepers, bailiffs, beadles, &c.

The four principal forests in England were accounted to be, the New Forest, Sherwood, Dean, and Windsor. Among the others were Epping, in Essex; Dartmoor, in Devonshire; Wichwood, in Oxfordshire; Salcey, Whittlebury, and Rockingham, in Northamptonshire; Waltham, in Lincolnshire; Richmond, in Yorkshire, &c.

The oppressive powers vested in the crown by the Forest Laws, after having to a great extent long ceased to be exercised, were revived by Charles I., and endeavoured to be turned to account in replenishing his empty exchequer. This was one of the grievances to which the Long Parliament directed its earliest attention; and since the passing of the 16 Chas. I. c. 16, the old Forest Laws may be considered as practically abolished, and the offices connected with their administration and execution are now nearly sinecures. [GAME LAWS; WOODS AND FORESTS.]

FOREST MARBLE, one of the upper beds of the Bath oolite series.

FOREST SCIENCE constitutes a separate and distinct branch of education, which originated in Germany from the increased scarcity of wood. In the Forest Academies are taught botany generally (and particularly as regards the ordinary productions of the forest, including vegetable physiology), mineralogy, zoology, chemistry, surveying, mensuration, mechanics, the methods of resisting the encroachments of sands, draining and embanking, together with the care and chase of game; and also the laws and regulations of forest administration. In Prussia and other German states, in France, and in Russia, similar studies are carried on.

The wood from forests is applied to the various purposes of house-building, ship-building, mill and wheel work, turnery, ornaments, fuel, &c.; and the study of its fitness for these purposes forms a part of forest science.

Preparatory to making a plantation of any extent it is necessary to establish a nursery to raise plants; for, although trees which are raised from seed and have never been moved become much larger and finer than those which are transplanted, it will be found on calculation that a quick return is much more profitable; and, as a matter of economy, trees which have been raised in a nursery and transplanted arrive sooner at a certain growth than those which are sown on the spot where they are to remain.

In England, where crooked pieces of large oaks are of value in ship-building, the side branches are not taken off higher than fifteen or twenty feet from the ground; and where trees have plenty of room, as in hedge-rows or parks, this may be judicious, but in close plantations it is of advantage to have a long stem without branches: in France and Germany the branches are always cut off to the height of thirty or forty feet.

FORESTALLING, ENGROSSING, &c. *Engrossing* is the offence of purchasing large quantities of any commodity in order to sell it again at a higher price. There are numerous statutes against this offence, and it was also an offence at common law. The English have not been singular in this absurd species of legislation.

Forestalling, also an offence at common law, is described in a statute of Edward VI. to be the buying or contracting for any merchandise or victual coming the way to market; or dissuading persons from bringing their goods or provisions there, or persuading them to enhance the price when there.

'*Regrating*,' says Blackstone, 'was described in the same statute to be buying of corn or other dead victual in any market and selling it again in the same market, or within four miles of the place. For this also enhances the price of provisions, as every successive seller must have a successive profit.' As to engrossing, Blackstone remarks, 'This must of course be injurious to the public, by putting it in the power of one or two rich men to raise the price of provisions at their own discretion.'

Notwithstanding the reasons given by Blackstone, all these offences have been abolished by 7 & 8 Vict. c. 24, entitled 'An Act for abolishing the offences of forestalling, regrating, and engrossing, and for repealing certain statutes passed in restraint of trade.' The English statutes which are repealed extend from the 51 Henry III. to the 5 & 6 Edward VI. c. 15.

FOREZ, a district of the former province of Lyonnais, in France, is now included in the department of Loire. It was divided into Haut-Forez and Bas-Forez, which had Feurs and Montbrison for their respective capitals, and Roannais, which was named from its chief town Roanne. [Lyonnais.]

FORFAR. [Forfarshire.]

FORFARSHIRE, a county of Scotland, is bounded E. by the German Ocean, S. by the Frith of Tay, W. by Perthshire, and N. by Aberdeenshire and Kincardineshire. It lies between 56° 27′ and 57° N. lat., and between 2° 28′ and 3° 22′ W. long. The greatest length, N. to S., is about 38 miles; the greatest breadth, E. to W., about 26 miles. The area is 840 square miles, or 537,600 acres, of which about 200,000 are under cultivation. The population in 1841 was 170,520.

There are four natural divisions of the surface. The first is the Grampian district, which comprises somewhat less than the north-western half of the county, and exhibits a tract of irregular mountain ridges, which, for the most part, have a shallow moorish soil, and are covered with short heath and large tracts of peat moss, but numerous valleys by which they are intersected are fertile and picturesque. Some of the Grampian Hills exceed 3000 feet in height. The second division is formed by the great valley of Strathmore, or Howe (hollow) of Angus, which extends across the centre of the county, from south-west to north-east. The third division consists of the Seedlay or Sidlaw Hills, which run parallel with the great chain of the Grampians, from the south-west extremity of the county. The fourth division is the maritime district, included between the Sidlaws and the shores of the Tay and the ocean. This tract is generally very fertile, under high cultivation, and adorned with numerous villages, plantations, farm offices, and elegant villas.

The Grampian Hills are of varied geological character. They consist of granite, having frequently topazes and rock crystal in its cavities and fissures; gneiss, with quartz, mica-slate, and garnets; limestone; large beds of slate; porphyry; veins of lead-ore. On the declivities of the Grampians are found slate, greenstone, basalt, limestone, sandstone, amygdaloid, and other varieties of rocks. In the Strathmore district, besides breccia, rubble-stone, and other soft strata, there is a shell-marl, which is procured in large quantities from beneath beds of peat-moss at the bottom of several ancient lochs which have been drained chiefly for this purpose, namely the lochs of Kinordie, Lundie, Logie, and Restennet. From the undrained lochs of Forfar, Rescobie, and Balgavies, it is dragged up by means of iron scoops worked from boats. It is used for manure. Iron and pipe-clay occur in this district. The Sidlaw district is composed chiefly of sandstone interstratified with indurated clay, and covered with various kinds of basalt, greenstone, and porphyry; it contains in different spots deposits of limestone, sandstone, clay-marl, lead, and copper; and specimens are met with of quartz, jasper, agate, and onyx. The maritime district contains beds of sandstone and extensive quarries of limestone. Fragments of granite from the Grampians lie strewed about the lower ground. Coal of an inferior quality has been traced a little to the west of Aberbrothwick. The poor, who cannot obtain coal without difficulty, procure for fuel peat, brushwood, broom, and furze.

The general colour of the soils of this county is red, inclining to brown and black. On the Grampians is generally found a thin stratum of moorish earth, through which the rock often juts from a subsoil of whitish clay. In the glens the alluvial soil is loose and friable, having a predominance of sand. In the lower parts of the county the primary soils are generally thin, mossy, and encumbered with loose stones. In the valley of Strathmore the soils are all alluvial, but seldom fertile. Some parts of this valley are gravelly, and others exhibit a soil of barren sand. Fine tracts of rich black and brown vegetable mould occur in several places. Along the coast there are downs of loose sand, partially covered with stunted grass, and useful only as burrowing ground for rabbits.

This county has about forty miles of sea-coast. Formerly there were few parishes without a lake. The number is now much reduced. Some have been drained to gain an extent of arable land, but many more have been wholly or partially drained for the sake of the rich marl manure beneath their beds. The following are the principal of those which remain: Lochlee, Lentrathen Loch, Forfar Loch, Loch of Rescobie, and the Loch of Montrose. The chief rivers of the county are the North Esk, the South Esk, the Isla, the Dean, the Lunan, and the Dighty: none of these are

large. The railways of the county are—the Aberdeen, the Arbroath and Forfar, the Dundee and Arbroath, the Dundee and Newtyle, the Dundee and Perth, and the Scottish Midland.

Numerous trees found in the mosses and marshy ground, consisting of enormous oaks, ashes, elms, and birches, indicate that formerly the lower part of this county was covered with forests. Some of the Grampian glens are partially clothed with oak and hazel coppices and natural birches; and others are covered with thriving plantations, but trees do not grow on the higher parts of the mountains.

The great variety of elevation in the maritime, inland, and alpine districts causes a correspondent variety of climate. On the high lands among the Grampians, where the snow lies on the summits during the greater part of the year, the air is generally cold and piercing. In the great midland valley, and in the sheltered parts of the maritime district, the climate is comparatively mild and genial. On the coast the easterly winds are occasionally very severe.

About a century ago a great proportion of this county was in the hands of a few ancient families; but, since the introduction of trade and manufactures, landed property has changed its possessors very frequently, and has become much more minutely divided and more equally distributed. The greatest number of the estates are held by charter from the crown, and are termed freehold. Farms vary much in size, some consisting only of 20 or 30 acres, others of 800 acres. They are generally from 100 to 250 acres. It may in general be stated that almost every useful improvement has been adopted in the modes and implements of agriculture in this county. Inclosures are made chiefly by stone dykes in the highlands, and by quick-thorn hedges in the plains of Strathmore and towards the sea. The chief crops are oats, barley, and wheat. Much of the oat crop is consumed by horses and exported from the county. Oatmeal porridge, eaten with milk or beer, forms the breakfast and supper of the labouring classes, among whom oat-cakes are still much used as bread. Considerable quantities of wheat are annually exported to London and other ports, and some American, Danzig, and other foreign wheats are imported to mix with that produced in the county. Barley is much used in the county for broth, porridge, and cakes. Peas, beans, vetches, turnips, cabbages, colewort, flax, clover, and rye-grass are also cultivated.

A large portion of the surface of this county on the Grampian and Sidlaw Hills is covered with natural pasture. This extent of land, rendered unfit for the plough by the number of loose stones and other obstacles, is estimated at about 40,000 acres. All the resident proprietors have gardens varying from one to five acres, well stocked with all the roots and culinary vegetables which thrive in this climate, and with all the common species of apple, pear, cherry, and plum. The ancient breed of horses in this county is small, but very hardy, and capable of enduring much fatigue with scanty nourishment. These animals are still numerous in the Grampian district. A few gentlemen rear horses for the turf, and keep studs of thorough-bred racers. Of late years much attention has been given to the breeding and treatment of horses, and very great improvement has been effected in their qualities, value, and appearance. The grazing and stall-feeding of cattle are prosecuted to a much greater extent than the rearing, large numbers being brought into the county to be fed and prepared for the butcher. The original sheep of this county is the small white-faced breed. Some small flocks of these still remain in the Grampians, but generally they are much crossed with the black-faced breed of Tweeddale, which constitutes a very large proportion of the whole stock of the county. Hogs have recently become very numerous, and are kept by every farmer and cottager. The common kinds of domestic poultry and pigeons are generally kept. A few bees are also very commonly kept, and produce excellent honey. Hares, rabbits, partridges, grouse, and blackcock are abundant. Wild roebucks traverse the extensive plantations and glens of the Grampian and Sidlaw Hills. There are also found red-deer, alpine hares, badgers, hedgehogs, foxes, polecats, and weazels; and on the coast are otters, seals, and sea-fowl in considerable abundance.

The deep-sea fishing off the eastern coast is very productive, and large quantities of salmon and smaller fish are taken in the Frith of Tay, and at the mouths of several streams from thence to the North Esk. Cod, ling, herrings, haddocks, turbots, sole, skate, sprats, smelts, lobsters, crabs, mussels, and fresh-water fish are all abundant.

The chief manufactures of the county are represented by those of its busiest town. [DUNDEE.] In order to render the approach to the Frith of Tay safer, the magnificent Bell Rock lighthouse has been built about 12 miles from the mouth. The shipping trade of the county from Dundee, Montrose, and Arbroath has become considerable.

Divisions and Towns.—Forfarshire is divided into 53 parishes. The county sends 1 member to parliament, besides which 1 member is returned for the borough of Dundee, and 1 member for the Montrose District.

The following are the principal towns, with the population of each in 1841 :—

Aberbrothwick, or *Arbroath*. [ABERBROTHOCK.]

Brechin, a royal burgh and market town, is situated 8 miles W.N.W. from Montrose. The town-house contains a guildhall on the second floor, with two smaller rooms for the meeting of council, and a court-room and prison below. There are 4 presbyterian meeting-houses, a parish church, consisting of the west end of the cathedral, an episcopalian chapel, and 3 public school-rooms. The eastern part of the cathedral was demolished at the time of the Reformation. Near the cathedral is a round tower, 108 feet high, well built of hewn stone, and in the upper part of the town are the ruins of the chapel of Maison Dieu, an almshouse formerly connected with the cathedral. Brechin Castle stands on the top of a precipice, and is separated from the town on the east and north by a deep ravine, while its southern base is washed by the South Esk, there formed into a

fine sheet of water. Population of the burgh, 3951. Brechin is a parliamentary borough, contributory to the Montrose District. Population, 5903. Brechin has railway communication with Montrose, Forfar, Arbroath, Dundee, and Perth.

Cupar-Angus is a small market-town on the Perthshire boundary line. The parish extends into both counties. The population of the town in Perthshire is 1543; in Forfarshire, 325.

Dundee. [DUNDEE.] A correspondent from Dundee, whose letter is dated Aug. 1848, states, that the harbour now consists of 3 wet-docks, 2 tide harbours, one of which is not yet completed, a graving-dock, patent slip, &c.

Forfar, the county-town, is situated 13 miles N. by W. from Dundee, and has railway communication with Arbroath, Montrose, Brechin, Dundee, and Perth. The town consists of two principal streets and several smaller streets. The principal public buildings are — the Town and County Hall, a sheriff's court-house, a parish church, another church erected in 1836, an episcopal chapel, and two or three other chapels for independents, &c. The inhabitants are chiefly employed in the linen manufacture. Population of the burgh, 8362. Forfar is contributory to the Montrose District. Population, 7891.

Kirriemuir, an ancient burgh of barony and market-town, situated 5 miles N.W. from Forfar. It consists of several irregular but good streets, and has an elegant church and episcopal chapel, each with a spire, a town-hall, and several other public buildings of modern date. Coarse canvass and various other brown linens are manufactured very extensively. Population of the town, 3067.

Montrose is a royal burgh and seaport, having separate jurisdiction. It is situated at the mouth of the South Esk river, between the large loch or basin of Montrose and the sea. In ancient times it was a place of considerable strength, surrounded by walls. One principal street, which is wide and regular, extends from north to south, and is crossed by several smaller streets and lanes. Many of the old houses present their gables to the street. Water is well supplied in pipes from a distance of three miles on the western side. The town is lighted with gas, and is well paved and cleansed. The river is crossed by a handsome chain suspension bridge, which cost above 20,000*l.* The church, in the middle of the town, is a large plain building, with a steeple, 200 feet in height, of modern erection. An episcopal chapel, and a chapel of ease are each commodious and neat places of worship, and the same remark is applicable to several chapels for dissenters. A custom-house, a town-house, prison, theatre, and post-office, a lunatic asylum, hospital, infirmary, and dispensary are the principal public buildings. Numerous bequests of benevolent persons form a poor's fund, amounting to upwards of 10,000*l.* There is a public academy, and there are two free schools and numerous other schools. The principal manufacture is flax-spinning and weaving. Ship-building is well executed. The number of vessels registered Jan. 1, 1848, was 114 (14,416 tons). The trade is almost entirely coastwise. The harbour is formed by a breastwork at the mouth of the river, within which vessels of large size can anchor. Lime, slate, flagstones, and numerous other articles are largely exported. Regular traders sail to London, and also to Leith. Population of the burgh, 13,402. The Montrose parliamentary District consists of Arbroath, Brechin, Forfar, and Montrose, in Forfarshire, and of Inverbervie, in Kincardineshire. Population of the borough of Montrose, 14,252. The entire population of the Montrose District is 43,568.

Antiquities.—On the edge of a deep ravine stands that part of Brechin Cathedral which escaped the demolishing zeal of the Reformers. It is partly formed into a commodious parish church. Close by, and joined by a passage, stands one of the curious round towers, of which, though so common in Ireland, only one other specimen exists in Britain, namely, at Abernethy, in the county of Perth. Next in dignity to the cathedral of Brechin, but far surpassing it in magnificence and extent, was the monastery of Aberbrothwick, of which the ruins stand on a lofty position overlooking the sea. The Priory of Restennet, of which the remains are on the lake of this name, near the town of Forfar, was a place of great strength, accessible only by a drawbridge.

Of the ancient vitrified forts, which occur in continuous chains along the heights of the northern parts of Scotland, there are three principal remains in this county. Hill forts are numerous; they all contain vestiges of rude buildings formed of loose uncemented stones, and are sufficiently large to have held the inhabitants of the surrounding district and their cattle, which in times of danger were driven therein. There are remains of several extensive Roman camps which formed a chain of military positions in a line from the south-west to the north-east sides of the county, including the towns of Forfar and Brechin.

Of baronial castles erected during the prevalence of the feudal system there are several magnificent specimens in this county; such a those at Broughty, Red Castle, Finhaven, Edzel, Invermark, Kelly, and Affleck. Various mounds, Druidical circles, cairns, and tumuli have been found. There is a considerable number of fine modern mansions.

(*New Historical Account of Scotland.*)

FORFEITURE, the punishment by loss of lands, estates, rights, offices, or personal effects, which is annexed by law to certain crimes, and also to certain illegal acts and neglect of duties in the holder of lands or offices.

Forfeiture is the French Forfaiture, which is from the word Forfait, 'a crime.' The distinction between Escheat and Forfeiture is explained under ATTAINDER. As to the nature of Forfeiture in the Criminal Law, see LAW, CRIMINAL.

Forfeiture, in civil cases, takes place if a tenant grants a larger estate than his own, as where a tenant for life or years assumes to convey the fee-simple. Also, if a copyholder commits waste, or refuses to do suit of court, or a lessee impugns the title of his lessor.

Forfeiture may also be the consequence of the breach of covenants between landlord and tenant,

or persons connected in tenure. The right to take advantage of a forfeiture may be waived by any act of the person entitled which recognizes the continuance of the title in the particular tenantcy, as, for instance, the receipt of rent by a landlord in respect of a time subsequent to the act by which the forfeiture is incurred.

Land may be forfeited by alienation contrary to law, as by alienation in mortmain without licence, or to an alien; in the former instance, if the immediate lord of the fee, or the lord paramount, neglect to enter, the king may; and in the latter, though the conveyance is effectual, yet, as an alien cannot hold lands, the king may enter, upon office found. [ALIEN; OFFICE FOUND.]

Offices are forfeited by the neglect or misbehaviour of the holders; and the right to the next presentation to ecclesiastical benefices is forfeited by Simony and by Lapse. [ADVOWSON; BENEFICE.]

The term Confiscation is not now used as a term of English law, but it was once in use, and was applied to those goods which were forfeited to the king's Exchequer. Goods confiscated, it is said, are generally such as were arrested and seized to the king's use, and therefore goods confiscated and goods forfeited are synonymous terms. If this explanation is right, Forfeiture is a more comprehensive term than Confiscation in English law.

Confiscation is from the Latin Confiscatio, which properly means the seizure of the property of an offender for the Imperial Fiscus, or the Imperial treasury. [FISCUS.]

FORFICU'LIDÆ, a family of insects belonging to the order *Orthoptera*, and, according to some authors, constituting the order *Dermaptera*.

To this family belong the various species of Earwigs. They are distinguished from the orthopterous insects (excepting the *Blattæ* and the *Mantis* tribe, which, with the *Forficulæ*, constitute Latreille's family *Cursoria*) by having the posterior legs formed for running: their wings, when folded, are almost always disposed horizontally on the body: the females have no corneous ovipositor; both sexes however are furnished with two corneous forcep-like appendages at the hinder extremity of the body: the antennæ are slender, filiform, inserted before the eyes, and vary considerably as to the number of their joints: the thorax is generally of a rounded form, and but slightly convex.

The family *Forficulidæ* is divided by Dr. Leach into three genera, the principal characters of which are taken from the number of joints to the attennæ. This first genus, that to which he restricted the name of *Forficula*, is distinguished by having fourteen joints to the antennæ. In the next genus (*Labidoura*) the antennæ have thirty joints; and in the last, the genus *Labia*, the antennæ are twelve-jointed.

The common Earwig (*Forficula auricularia*, Linn.) is too well known to require a description.

FORGERY, from the French *forger*, 'to heat metal and hammer it,' which is from the Latin *fingere*. From this sense of *forger* came the meaning 'to make,' generally, to invent. Legal forgery is the false making, counterfeiting, altering, or uttering any instrument or writing with a fraudulent intent, whereby another may be defrauded. The offence is complete by the making the forged instrument with a fraudulent intent, though it be not published or uttered; and the publishing or uttering of the instrument, knowing it to be forged, is punished in the same manner as the making or counterfeiting.

It is by no means necessary, to constitute forgery, that the name of any person should be counterfeited, though this is the most common mode in which the crime is committed. A man is guilty of forgery who antedates a deed for the purpose of defrauding other parties, though he signs his own name to the instrument; and it is forgery, if a man, being instructed to make the will of another, inserts provisions of his own authority. The offence consists in the fraud and deceit.

At common law the crime of forgery was only a misdemeanour; but as the commerce of the country increased, and paper credit became proportionally extended, many severe laws were enacted, which in most cases made the offence a capital felony. But by the Statute 11 Geo. IV. and 1 Wm. IV. c. 66, and other acts, the punishment of death is abolished in cases of forgery, and a punishment varying between transportation for life and imprisonment for two years is substituted. (1 Hawkins, 'P. C.'; Russell 'On Crime;' Deacon's 'Criminal Law.') [LAW, CRIMINAL.]

The statute law on forgery in general applies to Scotland as well as to England.

FORK (Anglo-Saxon *forc;* the same as the Latin *furca*), an instrument divided at the end into two or more prongs for various uses, especially for the table. Forks for the table were introduced from Italy into England in the beginning of the seventeenth century by Coryate.

FORLI', LEGAZIONE DI, a division of the Romagna and a province of the Papal State, is bounded N. by the province of Ravenna, W. by Tuscany, S. by the province of Pesaro-ed-Urbino, and E. by the Adriatic. Its area is reckoned at 1232 square miles, and the population is 188,000. The province is watered by the Rabbi, Ronco, Savio, Marecchia, and other rivers which have their sources in the Tuscan Apennines, and empty themselves into the Adriatic. The country is in part hilly, being occupied by offsets from the Apennine chain, which extend towards the Adriatic; the climate is healthier than that of the neighbouring flats of Ravenna. The principal productions are wheat, maize, barley, beans, vetches, hemp, hay, and wine. There are manufactories of silk, linen, and oil-cloth, and refineries of sulphur, which is found in the province. *Forlì*, the chief town, the ancient *Forum Livii*, is well built; the streets are lined with arcades. It has a fine square, several handsome palaces and churches ornamented with paintings, a lyceum, and fine public walks. Forlì is a bishop's see, and the residence of the legate of the province. The population is about 16,000. *Cesena*, a pretty town, near the foot of the Apennines, stands in a fertile country, watered by the Savio, over which is a fine bridge; it has a handsome town-house in the

market-place, which is adorned by a colossal statue of Pius VII., who, as well as his predecessor, Pius VI., was a native of this town. Cesena is a bishop's see, has an ecclesiastical college, and a valuable public library, collected by the Malatesti, the old lords of the Romagna. Population about 12,000. Half-way between Forlì and Cesena is the little town of *Forlimpopoli*, the ancient *Forum Popilii*, with a collegiate church, a castle built by Cesare Borgia, and about 2000 inhabitants. *Savignano*, on the road from Cesena to Rimini, has some good buildings and about 3000 inhabitants. Near it flows a small river, called by the peasantry *Il Rubicone*, which is now generally believed to be the ancient Rubicon. *Rimini*, the Roman *Ariminum*, a considerable town, with about 10,000 inhabitants, situated near the mouth of the Marecchia, which is here crossed by a handsome marble bridge of five arches and 220 feet long, built to connect the Æmilian and Flaminian Roads, in the reigns of Augustus and Tiberius, and still in very good preservation. The sea having receded all along this coast, the ancient harbour of Ariminum is now choked up with sand; but there is a small harbour at the mouth of the Marecchia which admits vessels of light burden, by which Rimini carries on some trade by sea. At the eastern entrance of the town, on the road to Rome, is a fine triumphal arch, erected in honour of Augustus Cæsar. There are also the remains of an amphitheatre. Among the modern buildings, the most attractive is the Cathedral Church of San-Francesco, built by Leon Battista Alberti for Sigismund Malatesta, lord of Rimini, about 1450; the interior is adorned with the sarcophagi and with many memorials of the Malatesta family. The Castel Malatesta, or fortress, is now used as a barrack. Rimini has a library of 30,000 volumes, a museum of antiquities, and a Lyceum. *Cesenatico*, on the sea-coast, N.E. of Cesena, has 4440 inhabitants, including its territory.

FORLI, MELOZZO DA, a celebrated painter of Forlì, where he was born about 1436. Melozzo was the first who ventured to foreshorten figures upon ceilings, and with such success that Correggio himself has scarcely surpassed him. He excelled generally in perspective.

FORMA PAU'PERIS. By the Statute 11 Hen. VII. c. 12, every poor person having cause of action or suit shall have, by the discretion of the chancellor, original writs or subpœnas, without paying for writing or sealing the same; and the judges of all courts of record, where such suit shall be carried on, are authorized to assign clerks to write for, and counsel and attorney to act for, such person without taking any reward. This indulgence is rarely refused upon petition, supported by affidavit that the petitioner is not worth 5*l.* in the world after paying his just debts, exclusive of his wearing apparel, and the right to the matter in controversy, and by a certificate by a barrister that he has good cause of action or suit. This statute extends only to plaintiffs in civil suits at law, but the courts of common law have a discretionary power to allow a party indicted to defend as a pauper, though without special cause shown the advantage is never given to a prosecutor. The court of Chancery, to which the Statute 11 Hen. VII. does not apply, has from an early period permitted parties to sue and defend as paupers upon the same conditions as the courts of law, though in that court, it seems, if the party be in possession of the subject matter in dispute, and that should be worth more than 5*l.*, he cannot except it in his affidavit, and therefore will not be regarded as a pauper.

A person allowed to sue *in forma pauperis* pays neither for stamps nor fees to the officers of the court, but, if he obtains a verdict with damages above 5*l.*, the officers take the fees. In case of improper or vexatious conduct on the part of the pauper, the courts will sometimes, though rarely, deprive him of the privilege, which is called dispaupering him.

FORMATION, a geological term subordinate to System, and including special Groups or assemblages of strata; in a looser sense it applies also to pyrogenous rocks and mineral veins.

FORMENTERA. [Balearic Islands.]

FORMIC ACID, or acid of ants. When these insects are irritated, they emit a sour fluid which contains both formic and malic acids. Formic acid may be prepared artificially; it is composed of $H^1 C^2 O^3$. It is a colourless liquid; its smell is pungent, and its taste very acid. Neither formic acid itself, nor the *formiates* which it produces by combining with bases, are of much use in practical chemistry or the arts.

FORMIC ÆTHER is a colourless liquid, of a strong odour resembling that of peach kernels: its taste is peculiar. Its specific gravity is 0.915 at 65°, and it boils at 132° Fahr. It consists of formic acid ^{1}, ether ^{1}.

FORMOSA. [Taiwan.]

FORMOSA, RIO. [Benin, River.]

FORMOSUS. [Pope.]

FORNAX (Constellation), the Chemist's Furnace, one of the southern constellations of Lacaille. It is situated immediately below Cetus.

FORSKAL, PETER, a celebrated naturalist and oriental traveller, was born in Sweden, in the year 1736. After studying at Göttingen, he returned to his native country. In 1759 he wrote his 'Pensées sur la Liberté Civile,' a pamphlet which did not prove agreeable to the ruling powers of Sweden. A fondness for natural history had brought him acquainted with Linnæus, then at the zenith of his fame, by whom he was favourably recommended to Frederick V., king of Denmark. In 1761 he obtained the title of Professor at Copenhagen, and, having been distinguished for his acquaintance with oriental languages, he was selected to join Niebuhr and others in an expedition to investigate Egypt and Arabia. After visiting Marseille, Malta, some of the Greek islands, and Constantinople, he arrived at Alexandria. For about a year he remained stationary in Cairo and its vicinity; he afterwards visited Suez, and, entering Arabia by Loheia, he penetrated by way of Beit el Fakih and Zebid as far as Mocha; thence crossing the mountains to Taæs and Abb, he eventually and with difficulty reached Jerim, where he died on the 11th of

July, 1763. In the course of this journey, although robbed and ill-treated by thieves near Alexandria and elsewhere, suffering from constitutional timidity, and often bowed down with sickness, he investigated with such extraordinary energy and perseverance the natural productions, especially the plants, of the places he visited, that, although he never lived to arrange his papers, the account of the vegetation of Egypt and Arabia, compiled after the return of his companions to Europe, is a model of the manner in which such investigations should be conducted.

FORSTER, JOHN REINHOLD, a naturalist, who accompanied Captain Cook in his voyage round the world, was born in 1729 at Dirschan in Western Prussia. He was to write the history of the voyage, and receive the profits of the publication; but when he returned the engagement made with him was not kept, and Captain Cook's book alone appeared. Forster's son afterwards published an account of the Voyage, and, as the publication was believed to be principally the father's work, the father lost all chance of remuneration by the admiralty.

Forster was a man of vast information in the natural sciences, philosophy, and general literature. After this treatment from the British government, he returned to Prussia, was received with honour by Frederick the Great, and died at Halle in 1798.

FORSTER, JOHN GEORGE, son of John Reinhold Forster, accompanied his father in the voyage with Captain Cook. After the French took Mainz in 1792, Forster, then librarian to the elector, having become enthusiastic in the cause of the Revolution, was sent by the republicans to Paris, to request the incorporation of Mainz with the French republic. While he was at Paris the Prussians retook Mainz, and Forster lost all his property, including his books and MSS. He died in 1794. He left several works.

FORSTER, GEORGE, a civil officer in the service of the East India Company, is chiefly known by his journey in 1782 over-land from India to Russia. His route was by the pass of Lall Dong into the Panjab, and through Cashmere, Cabal, Candahar, and thence by Herat to the Caspian Sea. He then sailed to Astrakan, and from that place travelled to Moscow.

From Oude to the Caspian he was nearly twelve months on his journey, the distance being 2700 miles, amidst all sorts of dangers and privations, which were much greater at that time than they would be at present. He died in 1792. His account of the journey forms an interesting and valuable book.

FORSTERITE, a right rhombic prismatic crystal, colourless, translucent, brilliant, and harder than quartz.

FORT, LE. [LEFORT.]

FORTEBRACCI. [BRACCIO FORTEBRACCI.]

FORTESCUE, SIR JOHN, lord chief justice of England in the reign of Henry VI., and afterwards chancellor. He was the author of a treatise, 'De Laudibus Legum Angliæ,' which has been several times translated into English. It is in the form of a dialogue between himself and the young prince Edward. The author undertakes to show that the common law was the most reasonable and the most ancient in Europe, and superior to the civil law and the laws of other countries. This book is written in a bold style, and displays many sentiments upon liberty and good government which are very remarkable, considering the period at which they were written. The English translation of the treatise, 'De Laudibus Legum Angliæ,' and the original Latin text, together with some notes by Mr. Amos, were published in 1825.

FORTH. [PERTHSHIRE.]

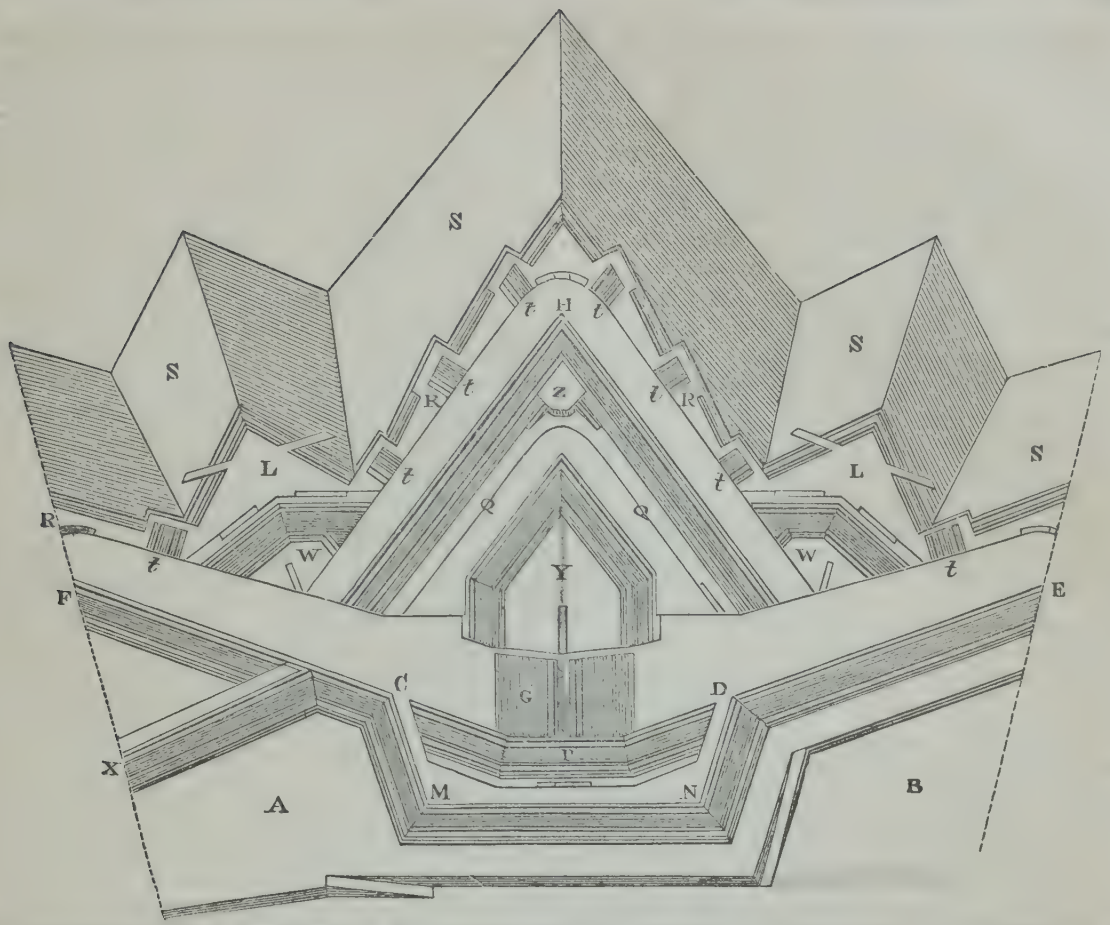
FORTIFICATION is the art of constructing works for the protection of a town or military position.

The principles which regulate the general plan of the works constituting the fortifications of a town, or great military post, have at all times been nearly the same. Among the ancients, with scarcely any exception, the polygonal wall surrounding a place was provided with towers projecting from it at intervals towards the front; and a barbacan, or outwork, consisting of two or more towers, connected by walls like those of the fortress itself, was generally constructed on the exterior side of the ditch and opposite a gate of the town, in order to protect that entrance and the bridge leading to it.

The necessity of remodelling fortified towns, in consequence of the change produced in the art of war by the invention of gunpowder, gave occasion for the engineers of Italy, France, and the Netherlands, to emulate each other in devising the most advantageous methods of disposing the works for the purposes of defence with relation to the arms then newly introduced; and the result of their labours was the construction of numerous strong fortresses on the frontiers of those countries.

The first bastioned fortresses of France appear to have been very inferior to those which were executed in the Netherlands by the Italian engineers; and there still exist some remains of these last in which the bastions are sufficiently capacious, and at distances from each other within the effective range of musket-shot. The others, on the contrary, were characterized by small bastions, scarcely capable of receiving artillery, and placed so far asunder as to defend each other very imperfectly. But during the reign of Louis XIV. a general reparation or reconstruction of its fortresses was ordered by the French government; and the talents of Vauban were exercised in devising and carrying into execution those improvements in the art of fortification which have given that engineer so much celebrity. Vauban adopted the length of the side of the polygon supposed to surround the place fortified as a base, and took certain aliquot parts of this line for the dimensions of the several divisions of the rampart; thus reducing the construction to a few simple precepts which were applicable to places of all magnitudes.

Some portions of the following figure, are explained and referred to in the article BASTION, in vol. ii. p. 981.



A, Solid Bastion. B, Hollow Bastion. X, Retrenchment. P, Tenaille. G, Caponniere. Q Q, Ravelin. Y, Redoubt, in Ravelin. L L, Re-entering Places of Arms. W W, Redoubts, in ditto. R R, Covered Way. *t t*, Traverses. S S, Glacis. Z, Barbette Battery.

The length of each side, as F E, of a regular polygon supposed to surround the town, or position, is made equal to 360 yards, in order that all the parts of the rampart on each front of the enceinte might be within the range of the arms employed in the defence. The faces F C, E D, of the bastions are in length 103 yards, or two-sevenths of the length of the side: the flanks C M D N are nearly perpendicular to the produced faces E D F C of the bastions respectively, and the line M N is the direction of the curtain.

The dimensions of a ditch are determined by the necessity of obtaining from it the earth for the formation of the ramparts and parapets. The counterscarp wall is rounded opposite the flanked angles at E, H, and F, and from thence, in the main ditch, it tends towards the shoulders C and D of the collateral bastions.

The figure Q Q represents the ravelin, the faces of which terminate on the main ditch, and are nearly equal in length to the faces of the bastion. [Ravelin.] Y is an interior ravelin or reduit.

The traverses *t t*, &c., in the covered way R R, &c., were proposed by Vauban, in order to diminish the effect of the ricochet [Ricochet]; and he formed spacious places of arms, as they are called, at L in the re-entering parts of the covered way, in order to obtain room for assembling troops.

An attention to the reliefs of the several ramparts of a fortress is no less necessary than to the plans: the height of a rampart should be sufficient to allow a fire of artillery to be directed from it over the glacis S S, &c., in its front. The crest of the enceinte thus determined will be about 18 feet above the ground, and that of the ravelin about 3 feet less.

As Vauban had occasionally to adapt works constructed according to the principles he had established to the old fortifications which then existed, the particular method employed in disposing them acquired the denomination of his second system; and, when subsequently he fortified Neu Brisach, some few modifications which he was led to make gave rise to a new distinction, the works of that place being considered as forming a third system.

It would be improper in this place to omit the name of Coehorn, who was a contemporary of Vauban, and who is also distinguished by the invention of three methods of fortifying places: of which however the first only, and that partially, has been put in execution. The outline of the plan differs but little from that of his rival's first system, but the shoulders of the bastions are strengthened by large towers, or orillons, containing casemates. A large ravelin, inclosing a smaller one on a higher level, is placed before the curtain, and the whole is surrounded by a broad covered way, whose places of arms are retrenched by brick redoubts. The terrepleins of the principal works are well defended by fire from the covered galleries which cross them, or which are formed within the masses of the ramparts.

It should be observed that the salient points E, F, H, of the bastions and ravelins in Vauban's system being nearly equally distant from the centre of the place, breaches may be formed and assaults made at one time in the enceinte and

outworks. With the view, therefore, of preserving the former untouched till some time after the ravelins may have been taken, the French engineer Cormontaingne proposed, about thirty years after the death of Vauban, to advance the salient points H of the ravelins as much as possible. By this construction it would become impossible for an enemy to crown the glacis of a bastion till he had got possession of the two collateral ravelins, on account of the fire which from these might be made upon his approaches between them; and the fall of the place would be delayed by the time spent in conducting the approaches from the ravelins to the intermediate bastion.

Cormontaingne made also several improvements in the details of the works. He made each face E D, F C, of the bastions equal to one-third of the length E F of the front; and he made the terrepleins of the ravelins merely wide enough to contain the artillery of the defenders, in order to increase the capacity of the redoubt Y in the ravelin, and to deprive the enemy of the space necessary for a battery on the ravelin, by which he might breach that redoubt. He also gave large casemated flanks to the latter work, in order that a powerful fire might be directed from them against the enemy. A further improvement was made by this engineer in adding to each of the re-entering places of arms a spacious redoubt W, which would render the defence of that place more obstinate, and cover the passage between the tenaille and the flank of the bastion. The above woodcut represents a front of fortification, with the improvements of Cormontaingne.

As early as 1640, Dillichs proposed a method of fortifying places, which consists of surrounding them by lines of rampart forming with each other a series of angles alternately salient and re-entering; and subsequently to the time of Vauban a few other projects of the like nature have been suggested. The most remarkable of these is that which was published in 1776 by the French General Montalembert, who entitles his method, 'Fortification Perpendiculaire.' Its outline on the plan is a series of the sides of equilateral triangles formed on those of a dodecagon inclosing the place, the re-entering angles being consequently right angles.

Three parallel ramparts of earth, of the form above indicated, and separated from one another by wet ditches, surround the place. In the re-entering angles of the two interior ramparts are formed casemated batteries, the fires from which would sweep the surfaces of the ditches in front, in the directions of their lengths; and within the enceinte of the place a circular redoubt or tower of brick-work, carrying several tiers of guns, is intended to defend the enceinte, if at length it should be forced.

During the existence of the French empire, the celebrated Carnot proposed to restore the balance between the attack and defence of fortresses, which the inventions of Vauban had made to preponderate greatly in favour of the former, by means of powerful sorties from the place, and an abundant discharge of stones and balls from mortars fired at considerable angles of elevation; thus annoying the besiegers in their trenches, and either putting great numbers of their men *hors de combat*, or compelling them to recur to the slow process of *blinding* their approaches. Adopting, in his method of fortifying places, the proportions of Cormontaingne for the plan of his bastions, but making the whole length of his front of fortification equal to 480 yards, he detached the bastions from the enceinte, which he made to consist of a simple polygonal rampart of earth. He proposed to surround the enceinte by a detached wall, which was to be loop-holed in order that a fire of musketry might be made from it, and to construct a similar wall before the faces and flanks of the bastions; the latter were to be covered by narrow counter guards, while large ravelins were to cover the central parts of the fronts of fortification and afford crossing fires on the ground before the bastions. A ditch surrounds the whole, and its exterior side is made with a gentle slope from the bottom to the level of the natural ground in front, for the purpose of facilitating sorties.

Soon after the commencement of the revolution, Bousmard, a French officer, proposed to curve the faces of bastions on the plan, in order to diminish or prevent the effect of the ricochet, and to build casemates in the flanks of the tenailles, for the purpose of more effectually defending the main ditch. But his principal improvement consisted in extending the covered way and glacis along the whole of the enceinte, and in placing the ravelin with its proper covered way and glacis on the exterior. The ideas of Bousmard respecting the disposition of the ravelin were adopted by General Chasseloup de Labat, in the works which he executed, by order of Napoleon, to strengthen the fortifications of Alessandria.

The last modification of the bastion system which it will be necessary to mention is that proposed by Choumara, who, in order to direct a close fire of musketry into the covered way, suggests that a terreplein, with a slender breastwork to protect the defenders, should be left on the exterior of the parapets. The same engineer recommends that the flanks of the bastions should be lengthened by continuing them within the line of the curtain, and that they should have a greater relief than the latter, in order that a fire of artillery might be directed over it against the works of the enemy.

In executing the continuous rampart about Paris, the French engineers have continued to follow the precepts of Vauban's school; but many of the works recently constructed in Germany consist of chains of detached redoubts beyond the old fortifications of a place, thus converting the ground about the place into a formidable intrenched camp. These redoubts are frequently polygonal works, strongly casemated, with reduits or keeps in the interior, and their ditches are defended by vaulted caponnieres built across them, with loop-holes for musketry, as well as by loop-holed galleries behind the counterscarps. The principal of these are Fort Alexander at Coblentz, and the Hartenberg Redoubts at Mainz. Linz, on the Danube, is strengthened by a chain of circular redoubts, casemated and having on the

roof guns which are mounted on traversing platforms.

For the works in the main ditch, see TENAILLE (P in the above cut), and CAPONNIERE (G in the cut), and for those which are occasionally constructed beyond the glacis of a fortress see FLECHE, HORNWORK, LUNETTES, and TENAILLONS.

Of the works which fall under the denomination of field-fortifications, BRIDGE-HEADS have been already mentioned. REDANS. REDOUBTS, and STAR-FORTS are described under those words; and the combinations of works which serve for the protection of armies, under LINES OF INTRENCHMENT. Small forts with bastions are frequently considered as field-fortifications: their plan is similar to that of the enceinte of a fortress; but they differ from the latter in their size, in having low relief, and in the sides of their ditches being unreveted, or only faced with sods.

FORTIGUERRA, NI'COLO, an Italian canon, whose writings display little of the austerity or seriousness of a churchman, was born at Pistoia, November 7th, 1674. His fame rests entirely upon his 'Ricciardetto,' an heroico-comic poem in thirty cantos, written, as has been stated, at the rate of a canto per day. Notwithstanding the grotesqueness of the characters and events, and likewise the occasional carelessness of the style, this long *improvisatore* poem abounds with so much comic humour, droll satire, and happy burlesque, that it has long taken its place as a classical work of its kind, and has gone through numerous editions.

FORTUNATE ISLANDS. [CANARIES.]

FORTUNE, in the Roman mythology, was a goddess who was supposed to dispose of the destinies of men. She was represented as blind, with winged feet, resting on a wheel. Fortune had temples in various parts of Italy and at Rome.

FORUM, a large open space in ancient Roman cities (corresponding to the Ágora of the Greeks), usually surrounded with public buildings, where the citizens met to transact business, and where, previous to the erection of Basilicæ, causes were tried. From this last circumstance the word forum is used metaphorically for a place of justice. The Roman fora were of two kinds, Fora Civilia and Venalia: the former were for law and political affairs, the latter for the purposes of trade. Rome contained nineteen chief fora, of which the Forum Romanum, Nervæ, Trajani, Boarium, and Piscatorium, alone retain any traces of the splendid edifices with which they were once adorned. A very beautiful restored view of the Forum Romanum was made by Mr. C. R. Cockerell, and a reduced view was engraved and published, with his permission, in the second volume of the 'Pompeii,' published by the Society for the Diffusion of Useful Knowledge.

FOSBROKE, REV. THOMAS DUDLEY (born in 1770, died in 1842), is the author of many miscellaneous works, chiefly on topographical subjects, of which the principal are the 'British Monachism, or Manners and Customs of the Monks and Nuns of England,' and the 'Encyclopædia of Antiquities, and Elements of Archæology.' He had much antiquarian knowledge, and chose good ground, because it was comparatively unoccupied, for pouring it forth. His books therefore are useful, without having the slightest pretensions to profound learning or original thought.

FOSCARI'NI, MARCO, born in 1698, of an old patrician family of Venice, which has produced many distinguished men, studied at Bologna, after which he was employed in official situations in the service of his country. In 1733 he was sent ambassador to the emperor Charles VI. He remained at Vienna for several years, and he had the arduous task of maintaining the neutrality of Venice during the war of 1733-35 between the French and the Austrians on the occasion of the Polish succession. Foscarini went subsequently as ambassador to Rome and to Turin.

In 1752 he published the first volume of his history of Venetian literature, 'Della Letteratura Veneziana Libri Otto,' vol. i. fol., Padua. This work, which was considered to be a model of literary history, established the reputation of Foscarini as an author. Its style is concise and dignified, and the authorities are carefully quoted and discussed in copious notes. Its plan was only partially completed.

In May, 1762, Foscarini was elected doge, but his tenure of that dignity was short, for he died in the following March, 1763, generally regretted. He was one of the last distinguished statesmen of Venice.

(Tipaldo, *Biografia degli Italiani Illustri del Secolo XVIII.*; Preface to the *Storia Arcana* of Foscarini.)

FOSCHI'NI, ANTONIO, was born June 16, 1741, at Corfu, of Ferrarese parents. He first studied engineering and hydraulics, but found architecture a more congenial pursuit, and to that he applied with the earnest desire of correcting the bad taste which for nearly two centuries had corrupted the art in Italy. Appointed to the professorship of architecture when Clement XIV. endeavoured to restore the University of Ferrara to its former splendour, he impressed upon the students the importance of those fundamental principles which had been more or less disregarded through aiming at superficial novelty without any freshness of invention for its basis. When deprived of his office through the exertions of enemies, he refused honours elsewhere, and remained at Ferrara till his death in 1803. The theatre of that place is his greatest work.

FO'SCOLO, UGO, was born at Zante about the year 1777, of a Venetian family settled in the Ionian Islands. When yet a boy he lost his father, and returned with his mother to Venice, whence he was sent to study at Padua. Having returned to Venice he published a tragedy, 'Il Tieste,' which was performed in January, 1797. In that same year the ancient aristocracy of Venice fell by the hands of Bonaparte, and Foscolo, who, like others of his countrymen, had expected the establishment of a new and popular republic, felt bitterly disappointed at the conqueror giving up Venice to Austria. He gave vent to his excited feelings in the 'Lettere di due Amanti,' afterwards published under the name of 'Lettere di Ortis.' This work had a prodigious

success in Italy; but most of the editions omitted a letter dated 17th of March, 1798, in which Foscolo clearly expressed his opinion of Bonaparte's character. Foscolo served as a volunteer in the Lombard Legion through the disastrous campaign of 1799, and followed the French in their retreat to Genoa, where he remained during the siege of that city till June, 1800, when the garrison capitulated, and was carried to France by the English ships. Meantime the battle of Marengo took place, Lombardy was reconquered, and Foscolo repaired to Milan. Peace being concluded soon after, he returned to private life and to his literary pursuits.

In 1802, Bonaparte having called together at Lyon a meeting of Italian deputies in order to devise a new constitution for the Cisalpine republic, Foscolo was requested by some individuals then in office, to write an address to the First Consul, with an exposition of the state of the country, and the wishes of the people. He did write it, but in a very different strain from what they expected: he wrote it in the style of the Philippics, or the Orations of Cicero against Verres; he drew an eloquent retrospect of the oppressions, the depredations, the injuries of every kind which the people of Italy had suffered at the hands of the various military and civil authorities appointed by the French since 1796. Foscolo remained for some years at Milan, and published an Italian version of Callimachus 'De Coma Berenices,' with interesting notes and commentaries.

In 1805 we find him again serving in an Italian regiment which formed part of the army assembled near the coast of the British Channel for the intended invasion of England. Being stationed at St. Omer he there commenced an Italian translation of Sterne's 'Sentimental Journey,' in which he was very successful. When a few months afterwards the camp of Boulogne was broken up, Foscolo went back to Milan, and did not return into active service. He lived for some time near Brescia, where he wrote his poem, 'Dei Sepolcri,' 1807, deprecating certain harsh regulations which forbade any monument or memorial being raised over the tombs of the dead. This beautiful little poem secured to Foscolo a distinguished rank among the Italian poets.

In 1808, Foscolo being appointed professor of Italian eloquence at Pavia, was again urged to begin his course by some tribute of praise to the emperor Napoleon; and it was hinted to him that the decoration of the Legion of Honour would be his reward. Foscolo took as the subject of his inaugural oration the origin and object of literature—descanted on the moral and civil duties of literary men; on the nobleness of their calling when conscientiously exercised; he exhorted the Italian youth to devote themselves to literature for its own sake; to study above all, the history of their country, and the lives and works of the great Italian writers. Foscolo said not a word about the emperor. A few months afterwards the chair of Italian eloquence was suppressed in all the universities of the kingdom of Italy, and Foscolo retired to Borgo di Vico, near Como. He there wrote his tragedy of 'Ajax,' which was performed at Milan, and not only proved a failure, but involved him in a sort of ministerial persecution, because he was suspected to have alluded in his play to Napoleon's ambition. He was banished from Milan. At Florence, where he fixed his residence, he completed his translation of Sterne; and wrote another tragedy entitled 'Ricciarda,' a Hymn to the Graces, and other compositions.

In 1813 he was allowed to return to Milan, and in the following year, when the French abandoned the country and a provisional government was formed, Foscolo was appointed major on the staff, and endeavoured, though ineffectually, to save the ex-minister Prina from the fury of the mob. When the Austrians took possession of Milan, Foscolo drew up a protest in the name of the inhabitants of Lombardy addressed to the Allied Powers. He remained however at Milan, but towards the end of 1814 repaired to Switzerland, where he resided for almost two years. Not finding sufficient encouragement in Switzerland for his literary labours as a means of subsistence, he came to England about the end of 1816, and was introduced to some of the best society of the metropolis: he formed literary connections and wrote articles both for the Edinburgh and the Quarterly Reviews. In London he published his 'Ricciarda,' the Essays on Petrarch and Dante, which are among his best compositions, and other works. He had engaged to superintend a new edition of Dante, with ample commentaries, but he did not live to finish this work. Want of order and of judgment in money matters involved him in embarrassments, which, joined to his fretful temper and assiduous application, shortened his days. He died of the dropsy on the 10th of October, 1827, at Turnham Green, near London, being about fifty years of age, and was buried in Chiswick churchyard, where there is a plain marble slab and incription over his tomb.

FOSS, or FOSS-WAY, an ancient Roman road in Britain, which extended from the coast of Lincolnshire, on the north-east, to the coast of Devonshire, on the south-west. It is supposed to have derived its name from the circumstance of its having had a ditch (fossa) on each side, and appears, from a Roman milliare or mile-stone found by its side near Leicester, to have been formed or at least improved by the Romans in the reign of Hadrian, and probably at or about the time of that emperor's visit to Britain. It has retained its name among all classes of people better than any of the Roman roads. (Reynolds, *Iter Britannicum.*)

FOSSANO. [Coni.]

FOSSA'TI, DOME'NICO, born at Venice in 1743, was the son of Giorgio Fossati, who, besides practising as an architect, was also a painter and engraver. Domenico Fossati commenced scene-painter, and was abundantly employed not only as such, but in adorning various palaces and churches with architectural and other decorative painting. He died in 1784, in consequence of an accident. He was standing on a scaffold painting a ceiling in a palace, when a workman incautiously removed one of the props, and the whole fell to the ground.

FOSSIL COPAL occurs in irregular pieces in clayey soils. Its colour is yellowish or dull brown; nearly opaque; specific gravity 1.046. When heated it yields an aromatic odour, and melts into a limpid fluid.

FOSSILS. The term Fossil in its primary sense signifies any substance dug out of the earth, but is generally used by geologists and mineralogists as the title either of simple or compound mineral bodies, or of the petrified forms of plants and animals which occur in various strata. To the latter the appellation *Petrificata*, petrifactions, soon became common in books and catalogues of cabinets; and then Sir John Hill's denomination of 'Extraneous, or Adventitious Fossils' was adopted by many. At present the animal and vegetable bodies penetrated by or converted into mineral substances are called 'Organic Remains.' Of these Organic Remains, that is, fossil plants and animals, some account is given under their respective heads, and in the articles which relate to existing families or genera which have fossil remains among them.

FOSSOMBRO'NI, VITTO'RIO, born in 1754, at Alezzo in Tuscany, of a noble family, studied at Pisa, and early exhibited a peculiar aptitude for the mathematical sciences. In 1794 he was appointed hydraulic superintendent of the Val di Chiana; on which he had previously written a treatise explaining the causes of the encroachment of the waters over that low but fertile district, and the remedies. The works commenced by him have been steadily carried on, and the valley restored to fertility and salubriousness. Fossombroni is the author of many valuable works on hydraulics. As a statesman, the respect paid him by all parties was remarkable. Through all the changes of the supreme government of that country, whether Tuscany was a grand duchy, or a kingdom, or a French province, or again a grand duchy, Fossombroni was employed, and generally in the most important departments of the state. At the time of his death in 1844 he was President of the Legislative Commission, Minister of Foreign Affairs, &c.

FOSTER, REV. JOHN, was born in the year 1770, in Yorkshire. He studied at the Baptist College, Bristol, and afterwards became a preacher. For the last eighteen or twenty years of his life he resided at Stapleton, near Bristol, chiefly occupied in literary pursuits, and preaching only occasionally. He died at Stapleton, Oct. 15, 1843.

Foster's reputation as an author is chiefly founded on his 'Essays,' which were first published in 1805, in the form of a series of letters, which, though intended for publication, were really addressed to the lady who soon afterwards became his wife. The only other work which he published in a separate form was a powerfully written 'Essay on the Evils of Popular Ignorance.' To the 'Eclectic Review' he contributed altogether 185 articles, of which 50 were selected and published in a separate form in 1844. A volume of lectures, edited from Foster's notes by his friend Mr. Jonathan Ryland, is said to be in the course of preparation.

John Foster's writings occupy only a small space, but they are of great merit. The 'Essays' have gone through numerous editions, and their well deserved popularity seems to be rather increasing than diminishing.

FOTHERGILL, JOHN, was born of a Quaker family, on the 8th of March, 1712, at Carr-End, near Richmond, in Yorkshire. After obtaining the elements of education in the school of Sedbergh, in the same county, he learned pharmacy from an eminent apothecary named Bartlett, and then proceeded to Edinburgh. Here he took his degree of M.D. in 1737, the thesis which he published on this occasion being on the use of emetics. In order to become a physician in practice as well as theory, he then diligently attended St. Thomas's Hospital, in London. In 1740 he travelled into Holland, France, and Germany, and afterwards settled in London. In 1748, an ulcerated or gangrenous sore throat, which had prevailed epidemically, gave Fothergill an opportunity of displaying his great practical talents.

The two most prominent points in the life of Dr. Fothergill are the remarkable success with which he practised his profession and the unwearied benevolence with which he distributed the fruits of his labours. It is supposed that he gave away at least 200,000*l*.

Dr. Fothergill published several papers in the 'Philosophical Transactions' on botanical, chemical, and medical science.

He improved the art of recovering persons apparently drowned; he also showed the necessity of prohibiting burials in towns, and the means of diminishing the frequency of fires. The editions of his works are those of London, 1781, 8vo; 1783, 3 vols., 8vo; 1784, 4to. Fothergill died Dec. 26, 1780.

FOUCHE', JOSEPH, duke of Otranto, was born in 1763 at Nantes. He was chiefly known as a lecturer on philosophical subjects until 1792, when he was returned by the department of Loire Inférieure as a member of the national convention, in which capacity he voted for the death of the king, and against the appeal to the nation. In 1793 he was sent with Collot d'Herbois on that mission which deluged Lyon with blood, but still he had the courage to oppose some measures of his infamous colleague. On his return to Paris, he was elected (1794) president of the Jacobin club, but he was soon expelled from it by the enmity of Robespierre. After the fall of Robespierre, Fouché being considered as a dangerous terrorist, was arrested, but afterwards liberated under the general amnesty in 1795. He remained in private life till 1798, when he was employed in Italy, and after his return to Paris the Directory nominated him minister of the police of the republic. It was in this capacity that he displayed his great talents, which were united with an extraordinary degree of courage, firmness, and activity. Having supported Bonaparte after his return from Egypt, he was confirmed in his office upon the establishment of the consulate. Fouché's vigilance maintained the tranquillity of the empire while Napoleon was occupied in foreign wars; and having the duties of minister of the interior

added to those of his office, he greatly contributed by his arrangements to prevent the success of the English expedition against Holland in 1809. In the last-mentioned year he was created duke of Otranto, but he fell out of favour for having used in his proclamation to the national guards the following expression—'Let us prove that Napoleon's presence is not necessary in order to repel our enemies.' In 1813 Fouché was made governor of the Illyrian provinces, but the progress of the allied troops compelled him to relinquish his post and to retire to Italy. After the abdication of Napoleon, Fouché again retired to his estates in the country, and refused to take any part in political intrigues. On Napoleon's return from Elba, he was suspected by the Bourbons, and an order was given for his arrest, but he contrived to make his escape. Napoleon again nominated Fouché minister of police, but he accepted the office only on the understanding that Austria and England secretly connived at Napoleon's return from Elba. As soon as he learned that the Congress of Vienna had declared against Napoleon, he tried to persuade the emperor, in case his negotiations should prove unsuccessful, to abdicate and retire to the United States of America. He strongly advocated the principles of liberty during the hundred days of Napoleon's second reign, and strongly urged the emperor to abdicate after the battle of Waterloo. Fouché being put at the head of the provisional government by the chambers, promoted the departure of Napoleon, negotiated with the allied powers, and by his intrigues baffled the scheme of Carnot and other patriots to defend Paris. At the beginning of the negotiation he was not inclined to promote the second restoration of Louis XVIII., but notwithstanding this he was called by the king, immediately after the capitulation of Paris, and nominated minister of police. This circumstance gave rise to a general belief that he had deceived Napoleon all the time after his return from Elba, and that he constantly maintained a secret correspondence with the allied powers and the Bourbons. In his capacity of minister of police he presented to the king two reports on the state of France, which by their boldness excited the hatred of all parties. His advice to grant a general amnesty was not followed; and he signed with his own hand as minister of police the ordonnance of Louis XVIII. of the 24th of July, 1815, by which many persons were excepted from the amnesty. Being driven by the hatred of the royalists to resign his office of minister of police, the king nominated him his ambassador to Dresden. The law of the 12th of January, 1816, by which all those who had voted for the death of Louis XVI. were banished from France and deprived of the estates which had been granted to them, was extended to Fouché also, who from that time lived in different parts of Austria. He died at Trieste in 1820.

FOUGASS, a small military mine, formed by sinking in the ground a box of powder, or one containing two or more loaded shells. The train of powder by which it is to be fired is contained in a linen tube, and this is frequently protected by being placed in a case of wood. A trench is cut in the ground to receive the train, but it is subsequently filled up.

Fougasses are sometimes employed in the defence of field forts, and then they are formed under the glacis of the latter at the points where the assault is expected.

FOUGÈRES. [Ille-et-Vilaine.]

FOUGEROLLES. [Saône, Haute.]

FOULAHS or FOULHAS, a nation widely spread along the western coasts of Africa, occupying the countries north of Cape Palmas as far as the banks of the river Senegal. They are of the middle size, well made, and very active. Their skin is of a light copper colour, and their faces of a form approaching nearer to those of Europe than any of the other tribes of Western Africa, the Moors excepted. Some are heathens; but many are Mohammedans, and send their children to schools, in which they learn to read and write. They speak a peculiar language, differing from those of the other nations among which they are settled. (Mungo Park; Goldbery; Gray.)

FOULIS, ROBERT and ANDREW, two learned printers of Scotland, passed their early days in obscurity. Ingenuity and perseverance however enabled them to establish a press, from which have issued some of the finest British specimens of correct and elegant printing. Of Robert Foulis's edition of Horace, the sheets as they were printed were hung up in the college at Glasgow, and a reward was offered to those who should discover an inaccuracy. Their success in thus reprinting the Greek and Latin classics produced them ample fortunes, but they were unhappily ruined by an attempt to establish an academy for the instruction of youth in painting and sculpture in Scotland. Andrew Foulis died September 15th, 1775, and Robert in 1776.

FOULSTON, JOHN. The name of this architect, who died at Plymouth, January 13th, 1842, aged sixty-nine, is especially connected with the history of that town and its neighbourhood, where, during the last thirty years of his life, he enjoyed a very extensive practice, and executed nearly all the public buildings then erected at Plymouth and Devonport (formerly Plymouth Dock), besides various general improvements, such as streets, and lines of uniformly built houses, distinguished by the name of 'Terraces.' Hence he has been called the 'Wren of Plymouth.' Greatly as he seems to have prided himself upon the correctness and purity of his taste in classical architecture, Foulston was by no means disposed to confine himself to the Grecian style, for he attempted every style in its turn, Egyptian and Hindoo not excepted. At Devonport, in the Town-hall, Column, Library, and Chapel, he clustered together into one group Grecian, Egyptian, and Hindoo, the two last of a very spurious kind, one of them being evidently borrowed from the building in Piccadilly, while for the Hindoo there seems to be no better authority than the architect's so naming it. The two first-mentioned structures are, on the contrary, highly creditable to Foulston's taste. The Royal Hotel at Plymouth gene-

rally passes for Foulston's *chef d'œuvre*, it being his largest building—one rivalling the chief post-office of London in size, as well as resembling it in design.

FOUNDATION, the lower part or courses of the basement walls or piers of a building. In foundations it is of the utmost importance to prevent the settlement of the walls in an unequal manner; this can only be done by making the earth on which the foundation is set equally solid throughout its whole extent.

The breadth of a substructure should be proportioned to the weight of the superstructure. Nicholson, in his 'Architectural Dictionary,' says, 'if the texture of the ground is supposed to be constant, and the materials of the same specific gravity, the breadth of the foundation will be as the area of the vertical section passing through the line on which the breadth is measured.'

Concrete composed of gravel or shingle and hot lime is often used to form a solid bearing for the footings of foundations. The greatest care and judgment are required in making foundations for heavy superstructures, for if the piles should be of a bad quality, and the ground in which they are driven of a very loose and boggy nature, the same catastrophe which occurred at the new custom house in London may be expected to take place. In this building it was found necessary to remove the piles and loose earth, and form a solid concrete foundation.

FOUNDING, one of the mechanical arts which embraces all the operations of reducing ores, and of smelting and casting metals. There are various branches of the art, and some difference prevails in the minor details of the processes, as in iron, brass, and bronze founding, in casting guns and cannon, types for printing, and bell founding. The art has been known and practised from the earliest ages.

The preparation of the ores of the principal metals is described under the names of those metals, such as COPPER; IRON; &c. The furnaces are described under FURNACE.

Founding is practised either in casting any quantity of metal in the solid, or with a core (by means of which the metal is preserved of a determined thickness or substance), or in plain casting. Before any object can be cast in metal it is necessary that a model of it be prepared. The models must be made of various substances; clay or wax, or sand with clay, are those usually employed, but they may also be of wood, stone, or any other material. Upon those models *moulds* must be made; these are commonly composed of plaster of Paris mixed with brickdust, sometimes sand, or sand with a mixture of cow-hair. For moulds for iron and brass work a yellowish sharp sand is preferred, which is prepared by mixing it with water and then rolling it on a flat board till it is well kneaded and fit for use. If the object is cylindrical, or of a form that admits of it, it is moulded and cast in two pieces; these two parts are then carefully joined together, and the edges or seams carefully cleaned. For the smaller class of works, instead of running the metal at once from a large furnace, earthen crucibles are used, into which the metal is thrown in small pieces: the crucible is placed in a strong heat in a close stove, and as the metal is melted and sinks more is added till the vessel is full. It is then lifted out by means of iron instruments adapted to the purpose, and the metal is poured from it into the moulds, in which channels or ducts for receiving it have been previously made.

In noticing the different ways of casting, mention has been made of one in which a core is used. The *core*, as its name denotes, is a part or portion situated within the body of the cast; and its purpose is to form a centre to the work by which the thickness or substance of the metal may be regulated. In coring, the mould must first be made complete; into this, clay or wax, or any other fit substance or material, is then squeezed or pressed in a layer of uniform thickness; in large works it is usually from half an inch to an inch thick. This layer represents the metal. The mould, if in parts, is then to be put together, the above-mentioned layer being left within it, and into the open space in the centre a composition (usually of plaster of Paris with other substances mixed with it) is introduced, and made to adhere to the clay or wax, or rather is filled up to it. This is the core, and it is often made to occupy the whole interior of the mould. When this is *set*, or dry, the mould is taken to pieces, and the material which has been made to represent the metal removed. The mould is then again put carefully together round its core or nucleus, the two portions being secured from contact by stops and keys properly arranged for that purpose. The mould and core are dried to dissipate moisture; and large moulds are strengthened with iron hoops. Channels or ducts are made for the entrance of the melted metal; and others are also made for allowing the air to escape as the melted metal enters the mould; these are called vents. With respect to placing the mould, it is only important to secure a sufficient inclination of plane from the mouth of the furnace to the mould that the metal may run easily and uninterruptedly, and not have time to grow cool and therefore sluggish. The usual method in great bronze works is to bury the mould in a pit a little below the level of the furnace, and by ramming sand firmly round it to insure its not being affected by any sudden or violent shock, or by the weight of metal running into it. When every thing is ready and the metal found to be in a state fit for running, the orifice or mouth of the furnace (which is usually plugged with clay and sand) is opened, when the metal descends, and in a few minutes the mould is filled. The metal is allowed to run till it overflows the mouths of the channels into the mould. The work is then left to cool, after which the mould is scraped or knocked off and the cast undergoes the necessary processes (such as cleaning, chasing, &c.) to render it fit for the purpose designed. Large bells and statues are cast in this way.

Brass ordnance is always cast solid. The model is made round a nucleus of wood called a spindle, and the mould of loam and sand made over it. When this is perfectly dry, the model

and spindle within are removed, and the mould is well dried or baked. When ready for casting, it is placed upright in the pit, and the metal is allowed to run into it till filled. What is called a dead head is left at the upper and smaller or mouth end of the gun, which presses the metal down, and prevents its becoming porous as it settles and cools. After a few days the mould is knocked off, and the gun is ready for finishing. The dead head is turned off, and the boring, which is an operation requiring great care, is effected.

After the founding, the metal cast is often finished by chasing, burnishing, lacquering, plating, or gilding.

FOUNDLING HOSPITALS are charitable institutions, which exist in most large towns of Europe, for taking care of infants forsaken by their parents, such being generally the offspring of illegitimate connections. These institutions date from the Middle Ages, and were established for the purpose of preventing the destruction of children either by actual violence or by being exposed in the streets or highways.

In France the philanthropist Vincent de Paul, the founder of the Society of the Missions, in the first half of the 17th century, exerted himself to found an asylum for infants, which were at that time frequently left to perish in the streets of Paris. It was at first supported by private subscriptions, but afterwards was made a national establishment—'Hôpital des Enfans trouvés.' Similar institutions were founded in other great French cities. In 1841 there were 70,838 illegitimate children born in France—about one thirteenth of the whole number of births; but in Paris the proportion is much greater, being one illegitimate child to every 2.7 births. Of the whole number of illegitimate children, about 58 out of every 100 are abandoned by their mothers and taken to the foundling hospitals, where nearly two-thirds of them die before they are a year old.

In 1739 a charter was granted for establishing a foundling hospital in London. In the following year a temporary house was opened in Hatton Garden. It was not till the opening of the present building that the system was fully developed. Then the act of application was rendered as little troublesome and disagreeable as possible. A basket was hung at the gate, and the only trouble imposed on parents was the ringing of a bell as they deposited their child. In 1756, when the new system began, 1783 children were received. The number in 1757 was 3727. In three years and ten months from June, 1756, the number had increased to nearly 15,000. Various abuses which, strange to say, had not been foreseen, developed themselves. Vigilant overseers of the poor occasionally relieved the ratepayers by dropping into the basket at the hospital a child or two that they feared might become chargeable, or they frightened the mothers into the act when they had no desire to part with their offspring. Moreover, the institution had got into full play before anything like a system of regulations could be adopted for preserving the life and health of the foundlings, and there was even a scandalous want of wet-nurses. Out of 14,934 children received in less than four years, only 4400 lived to be apprenticed. Parliament now interposed, stopped all indiscriminate admission, and left the hospital to the limits of its own funds.

By the regulations now in force, 'No person need apply unless she shall have previously borne a good character for virtue, sobriety, and honesty.' The other qualifications are—the poverty of the applicant, the illegitimacy of her infant, the abandonment by the father, and the non-cognizance of the case by the parish authorities. If the result of the investigation (made with great delicacy and scrupulous secrecy) be satisfactory, the admission of the child is secured either at once, if there be a vacancy, or when a vacancy occurs. The number of children is limited to 360. On leaving her child the mother receives a certificate in return, to which is attached a private mark, by which the authorities of the hospital may, if requisite, subsequently recognize the child, and a corresponding mark is carefully attached to the child's clothing; but, as respects the mother, it is probable that the child is severed from her for ever, and that she will never again be able to recognize it. The child may be restored at a future time if the mother can give the most satisfactory proofs of her ability to maintain it; but this claim is of rare occurrence. The children are sent out to nurse until they are five years old; then they return to the hospital for their education, and at its completion are apprenticed to some trade.

In 1833 there were 8130 children maintained in the three foundling hospitals in Ireland. By the Irish Poor Law Act the hospitals were to be converted into union workhouses, and thus virtually abolished.

FOUNTAIN, a jet or jets of water, flowing either naturally out of the earth, or from structures formed by art. Artificial fountains consist of water flowing from statues, vases, or architectural buildings combined with sculptured figures and other ornamental decorations. At Pompeii not only the streets but even the private houses were decorated with fountains. At Rome, the proper distribution of the rivers which flowed through her aqueducts was a matter of great importance, intrusted to the care of an officer of very high rank. The aqueducts were each charged with a certain number of pipes of supply; and no new pipe could be inserted without a special application to the emperor. Those whose means of interest were insufficient to obtain a private pipe, were obliged to fetch water from the public fountains.

Some of the cities of Italy and the East are adorned with fountains, which are no less agreeable to the eye than useful to the inhabitants. Many of the fountains of Rome are highly decorated, of great magnitude, and very varied in their mode of ejecting the waters with which they are supplied from the existing aqueducts.

The city of Paris is well supplied with fountains, many of which are elegantly designed. The fountains of Versailles and St. Cloud in France, and the fountains at Wilhelmshöhe near

Cassel, are the largest in Europe. London has no fountains worthy of notice except the two large ones in Trafalgar Square, which are supplied from a very deep artesian well.

FOUQUIERACEÆ, a natural order of plants belonging to Lindley's syncarpous group of polypetalous Exogens. There are only two genera comprehended in this order: *Fouquiera*, named after Dr. Peter Edward Fouquière, a professor of medicine at Paris, and *Bronnia*, named in honour of Henry George Bronn, who has written on leguminous plants. Each of these genera has a single species: both plants are natives of Mexico. Of their properties little is known. *F. formosa* is a showy shrub, and may be grown in a light rich soil, and propagated by means of cuttings, which will root freely in sand under a hand-glass in heat. *Bronnia* has been referred by some botanists to *Tamaricaceæ*.

FOURCROY, ANTOINE-FRANÇOIS DE, an eminent French chemist, was born at Paris, June 15, 1755, and grew up in the midst of poverty. When seven years old, he lost his mother, and his sister maintained him with difficulty till he went to college; which, in consequence of the ill-treatment of a master, he left at fourteen years of age. By the advice of Vicq-d'Azyr he commenced the study of medicine; and after successfully struggling against every kind of difficulty, he at last obtained the necessary qualification to practise in Paris. The first writings of Fourcroy did not evince any peculiar predilection for any particular branch of science; he wrote upon natural history, anatomy, and chemistry. After the death of Macquer, which happened in 1784, he succeeded to the chair of professor of chemistry at the Jardin du Roi, and he continued there till his death, which took place 25 years afterwards.

After the fall of Robespierre, Fourcroy was instrumental in founding numerous schools of science in France; and the great exertions which he made in these and other duties, gradually undermined his constitution: he was sensible of his approaching death, and announced it to his friends as an event which would speedily take place. On the 16th of December, 1809, after signing some despatches, he suddenly exclaimed—'Je suis mort,' and fell lifeless on the ground.

M. de Fourcroy was twice married; by his first wife he left a son and a daughter.

Fourcroy was a voluminous writer on chemistry. He wrote a 'History' and a 'Philosophy' of that science; and contributed more than a hundred and sixty papers to the scientific journals of France. Among his best contributions to the science are the following:—

He ascertained that the most common biliary calculi are composed of a substance similar to spermaceti. It is to him that we are indebted for the first knowledge of the fact, that the salts of magnesia and ammonia have the property of uniting together and forming double salts. His dissertation on the sulphate of mercury contains some good observations. The same remark applies to his paper on the action of ammonia on the sulphate, nitrate, and muriate of mercury; and he first described the double salts which are formed. The analyses of urine and of calculi were valuable contributions to animal chemistry. We may mention the process of Fourcroy and Vauquelin for obtaining pure barytes, by exposing nitrate of barytes to a red heat, as a good one. They discovered the existence of phosphate of magnesia in the bones, of phosphorus in the brain, and in the milts of fishes, and a considerable quantity of saccharine matter in the bulb of the common onion, which, by undergoing a kind of spontaneous fermentation, was converted into manna.

FOURIER, JOSEPH, was born at Auxerre in 1768: he was the son of a tailor in that town, and there received his education at a school directed by the Benedictines. Into this order he was about to enter, and had passed a part of his novitiate, when the Revolution commenced. He had applied himself very early to the mathematics, and had gained such reputation, that in 1789 he was appointed professor in the school at which he formerly studied. He had not confined himself to one branch of learning, as appears from his giving courses of history, rhetoric, and philosophy. Before this time, in 1787, he had sent to Paris a memoir on the theory of equations, to be presented to the Academy of Sciences. This memoir contained the first steps of the theory which was afterwards published: it was lost during the Revolution, but a sufficiently attested copy exists.

Fourier took some part in the civil troubles at their commencement, and was a member of the Committee of Public Safety at Auxerre. In 1798 Monge proposed to him to accompany the expedition to Egypt. His occupations in that country were various: he was secretary of the Institute which was formed at Cairo, he superintended the commission which was employed in collecting materials for the great work on Egypt, and was employed in judicial and diplomatic capacities. At his return from Egypt he was appointed by the first consul prefect of the department of Isère, which place he continued to fill till 1815, his situation having been preserved to him at the fall of Napoleon in 1814, by the high estimation in which he was held, and the gratitude of those adherents of the old monarchy whom he had served. When Napoleon, in 1815, passed through Grenoble (a town of Fourier's prefecture), Fourier, who had hesitated much, issued a moderate Bourbonist proclamation, and left the town by one gate as Napoleon entered it by another. Napoleon was extremely enraged at this step, and causing Fourier to be brought into his presence, reminded him in strong terms of former benefits, and telling him that, after the proclamation, he could not remain at Grenoble, appointed him prefect of the department of the Rhône. Fourier appears to have been softened by the matter, or subdued by the manner, of Napoleon's address to him, and went quietly to his new post. He resigned it however on the 1st of May, in consequence of his determination not to execute the orders of Carnot, which required him to make numerous arrests among the Bourbonites; and he was in Paris when the news of the battle of Waterloo arrived. Here he remained for some time, entirely neglected, and with very moderate funds, until his former pupil, M.

de Chabrol, gave him the superintendence of a Bureau de Statistique. In 1816 he was chosen a member of the Institute, but Louis XVIII. refused to ratify the election, and it was not till a year after that this king could be induced to allow it. On the death of Delambre he was chosen secretary of the Academy, and on that of Laplace president of the council of the Polytechnic School. Fourier died at Paris in May, 1830.

The writings of Fourier consist of papers in the Memoirs of the Academy of Sciences, the 'Annales de Physique,' and the 'Récherches Statistiques sur la Ville de Paris,' &c., as well as of two separate works, namely, the 'Théorie de la Chaleur,' Paris, 1822, and the 'Analyse des Equations déterminées,' Paris, 1831. The last work is posthumous, and was completed under the inspection of M. Navier.

In the first of the two works, the object of which is the deduction of the mathematical laws of the propagation of heat through solids, Fourier extended the solution of partial differential equations, gave some remarkable views on the solution of equations with an infinite number of terms, expressed the particular value of a function by means of a definite integral containing its general value (which is called *Fourier's Theorem*), &c. This work is full of interesting details, and is one of the highest productions of analysis of our day.

The latter of the two works contains the remarkable extension and completion of Descartes' well known rule of signs, by means of which the number of the real roots of an equation may be determined. This treatise of Fourier, published by M. Navier, is only the first part of the work: the remainder has not yet appeared. A full account of its principal points will be found in Mr. Peacock's Report on Analysis to the British Association.

FOURIER, CHARLES, was born at Besançon, in Franche-Comté, April 7, 1772. He was the son of a merchant of that city. After completing his studies at Besançon and Dijon, Fourier was placed in a commercial house at Rouen; he removed to Lyon in 1790, or just when the Revolution was beginning. Through a decree of the National Convention, Fourier among other citizens had to enter the army, and was for two years with the army of the Rhine and the Moselle. Ill health led to his release from a military life, and he entered a commercial house at Marseille. In 1800, having returned to Lyon, he published some articles in the newspapers, one of which attracted the attention of Napoleon, who caused inquiries to be made about Fourier, which however ended in nothing. In 1808 Fourier commenced the series of labours that were to make his name so widely known, by publishing a Prospectus of his views, under the title of 'Théorie des Quatre Mouvements et des Destinées Générales.' Very few copies were sold, and Fourier continued his commercial pursuits, and at the same time prosecuted his studies in private. Having a small patrimony, in 1814 he retired from trade, and gave himself up to study alone. During the hundred days of Napoleon's reign after the return from Elba, Fourier held the office of the head of the statistical department of the prefecture of Lyon, to which his namesake Count Fourier had appointed him. On the restoration, Fourier left Lyon and returned to Tallissieu, to spend the winter in a sister's family; and thence to Belley with a similar object, and there he remained until 1821, occupied exclusively in preparing the manuscript of his future publication.

In 1821 Fourier returned to his native place, and there began to print his work, in nine large volumes, of which two only have appeared, though the rest is in MS. It is entitled 'Theory of Universal Unity.' The fact of the sale of a thousand copies between 1821 and 1842 shows the progress which his views had made. In November, 1822, Fourier went to Paris, in order to sell the 2 volumes of his work which were completed, but had to return to Lyon in poverty and disappointment. Here he was once more compelled to engage in commercial pursuits. Disciples however began to appear at last. One of them would have Fourier come to reside with him at his country house, near Lons-le-Saulnier, to write an elementary treatise for general readers. This was begun, but not completed for two years. It was printed at Besançon, in 1828-9, under the title 'The New Industrial World.' Another disciple, Madame Clarissa Vigoureux, kept him as her guest at this period, and subsequently devoted her whole fortune to the dissemination of his theories. The compendium was not more fortunate in Paris than its predecessor. The St. Simonians occupied the attention of the Social Reformers of the day in France, and Robert Owen in England, so that Fourier could not get a hearing; and at last he attacked both in 1831, in a pamphlet entitled 'The Fallacy and Charlatanry of the St. Simonians and the Owenites.' This drew attention to him; his disciples became numerous, and they enabled him to establish a weekly journal, called the 'Phalanstery.' It was commenced in 1832, and was discontinued in 1834, but in 1836 his friends commenced another journal, called the 'Phalange,' at first monthly, then fortnightly, then three times a week, and at last it became a daily paper under the title of 'La Démocratie Pacifique.' During the recent events in Paris (1848) this paper has greatly increased its circulation, and is now the leading organ of the Social Reformers.

Simultaneous with the attempts to establish this periodical were the attempts to found a successful practical experiment in illustration of the new social theory; but this has hitherto failed in France. In America, where the theories of Fourier have many advocates, and where land may be purchased at a cheap rate, many practical experiments are constantly being made. In 1837 Fourier's health rapidly declined, and he died at Paris, on the 10th of October in that year.

Fourier's philosophy attempts to prove that our affections, desires, passions, &c., rightly impel us to seek their gratification, and that it is because they are not permitted to develop themselves naturally and harmoniously within the limits of wise social arrangements, that they so often lead to vice instead of to virtue, to misery instead of to happiness. Upon this metaphysical basis Fourier

seeks to erect a new social structure, in which capital, skill, and labour, shall each in its place work harmoniously together for the general good, and under circumstances calculated to make industry pleasant, to call forth all men's natural powers, to surround them with abundance, and to make them enlightened, friendly, and happy. A popular exposition of his views is given in Briancourt's 'Organization of Labour,' lately translated by Francis G. Shaw, of America. 'Fourier and his System,' has also been translated into English by C. T. Wood, junr., from the French of Madame Gatti de Gamond.

FOURMO'NT, ETIE'NNE, born at Herbelay, near Paris, in 1683, made himself master of the Latin, Greek, Hebrew, Syriac, and Arabic, and was appointed professor of the last-mentioned language in the College Royal of Paris. His chief work is a Chinese Grammar, which cost him twenty years of study: 'Linguæ Sinarum Mandirinicæ Grammatica Duplex, Latine et cum Characteribus Sinensium,' fol., 1742. He died at Paris, in December, 1745.

FOURMONT, MICHE'L, younger brother of Etienne, born in 1690, assisted his brother in his philological labours: he was made professor of Syriac, in the College Royal in 1720. In 1726 he was sent by the government to Greece to purchase MSS. and copy inscriptions. He boasted of having copied more than 1000 inscriptions, chiefly in Attica and the Peloponnesus, which had escaped the researches of Spon and Wheeler and other travellers. These copies were deposited in the royal library at Paris. Many of these inscriptions are authentic, but others are forgeries. Fourmont absurdly boasts of having defaced or destroyed the remains of antiquity of several cities of Greece, and among others those of the temple of Jupiter at Amyclæ. (Dodwell, 'Tour through Greece,' vol. ii. ch. 11.) He died in 1746. having published only some detached papers in the 'Memoirs of the Academy of Inscriptions,' of which he was a member. His nephew, Claude Louis Fourmont, who had accompanied him to Greece, returned to the Levant, and remained several years in Egypt. On his return to France he published a 'Description Historique et Géographique des Plaines d'Heliopolis et de Memphis,' 12mo., 1755.

FOURTH, an interval in music whose ratio is $\frac{4}{3}$. There are three varieties: the *Diminished Fourth* (1 tone and 2 semitones); the *Perfect Fourth* (2 tones and 1 semitone); and the *Sharp Fourth* (3 tones).

FOWEY. [Cornwall.]

FOWLING, the act or art of taking birds with nets, by shooting, snares, the use of bird-lime, or other devices. It is also sometimes used for the taking of birds with hawks and falcons, more properly called *Falconry*. In Latin this sport is termed *Aucupium*. (See Bargæus, 'Re Aucupio, Liber I.,' 4to., Flor. 1566.) Olina's 'Uccelliera,' 4to., Rom. 1684, is another work on fowling, the plates of which, representing the different modes of following the sport, are extremely curious. In English we have Blore's 'Gentleman's Recreations,' fol., Lond. 1686 and 1716; and 'The Experienced Fowler, or the Gentleman's Recreation,' 16mo., Lond. 1704.

FOX, *Vulpes*, Brisson, the generic name for a section of the family *Canidæ*, or *Dogs*, distinguished from the restricted genus *Canis* by the pupils of the eye being linear when contracted by day, by the peculiar sharpness of the muzzle, the length of the body, and the bushiness of the tail. Habits nocturnal. These are trivial characters, and in South America, there are some forms which take an intermediate place between the dogs and foxes, and have been formed into distinct genera by Col. H. Smith. Such are the Aguara Dogs, which are subdiurnal and burrowing in their habits: the body is stout and low; the tail consists of an imperfect brush never reaching below the heel; the limbs are small; and the colouring fulvous brown and hairy, mixed more or less with black. Examples, *Ducicyon canescens*, Smith, *D. antarcticus*, *D. sylvestris*, *D. fulvipes* (*Vulpes fulvipes*, Martin, in 'Proceeds. Zool. Soc.'). Another group is denominated Aguara Foxes (Genus *Cerdocyon*, H. Smith). Tail with a brush even longer and larger than those of true foxes; legs low; fur deep and full; colours grey, white, buff, and black; tip of the tail always black; eyes rather adapted for crepuscular than nocturnal habits. Examples, *Cerdocyon mesoleucus*, H. Smith, Guaraxa Aguara Fox (*C. guaraxa*), Crabodago Aguara Fox, *C. Azaræ* (*Canis Azaræ*, Prince Maxim.), Magellanic Aguara Fox, *C. Magellanicus* (*Vulpes Magellanicus*, Gray).

The true foxes (Genus *Vulpes*), of nocturnal habits, and with the pupil contracting into a vertical slit, are thus divided by the same eminent zoologist.

Section I. Arctic Foxes.—Feet furred, fur very thick and abundant, colour variable from white to a blueish liver colour; stature low; they swim, and feed on fish, &c.; migratory; belong to the Arctic Zone of both continents.

Vulpes lagopus, the Arctic Fox, *Isatis* of Gmelin.
V. fuliginosus, the Sooty Fox (variety of Arctic Fox?).

Section II. On the Eastern Continent north of the Tropic.

With black tip to the tail.

Vulpes alopex	The Coal Fox.
V. ——— ?	The Brant Fox.
V. Hodgsonii	The Nepaul Fox.

With white tip to the tail.

Vulpes vulgaris	The Common Fox.
———	The Norway Fox.
V. Melanogaster	The Roman Fox.
V. Crucigera	The Cross Fox.
———	The Black Fox.
V. Himalaicus	The Himalayan Fox.
———	The Indian Fox.
V. Thaleb	The Syrian Fox.
V. Niloticus	The Egyptian Fox.

Section III. Foxes of America.

With white tip to the tail.

Vulpes fulvus . . .	The Red Fox.
V. decussatus . . .	The American Cross Fox.

V. argenteus . . . . The Silver Fox.
V. velong (say) . . . The Little Fox.
V. cinereo-argentatus . The Tricoloured Fox.

With black tip to the tail.

Vulpes cinereus The Gray Fox.
———— The Brant Fox of Pennsylvania.
———— Fox? of Iceland.

How far all the species above enumerated may be truly distinct, is not very clear—we have thus however a comprehensive view of the subject.

To enter into extensive details is out of the question. The Common Fox (*Vulpes vulgaris*) needs no description. It is spread over Europe generally, and is every where noted for its cunning and address, as well as for its prowling nocturnal habits. In England it is preserved for the sake of those who are devoted to the chase. The female goes from 60 to 65 days with young, and produces, generally in April, from three to five at a birth. The offensive odour of the anal glands is very powerful. Inhabits burrows, and feeds upon rabbits, hares, pheasants, partridges, game of all sorts, and poultry, and also upon fruits, honey, and eggs. This species is *Le Renard* of the French, *Volpe* of the Italians, *Raposa* of the Spanish, *Fuchs* of the Germans, *Vos* of the Dutch, *Raff* of the Swedes, *Rev* of the Danes, *Tod* of the Scotch. In North America, the Common Fox is represented by the Red Fox (*Vulpes fulvus*).

American Red Fox (*Vulpes fulvus*).

This species, though it agrees in general manners with our Reynard, possesses neither the wind nor the same powers of endurance. 'It runs (says Dr. Richardson) for about a hundred yards with great swiftness, but its strength is exhausted in the first burst, and it is soon overtaken by a wolf or mounted horseman.' The fur of the Red Fox, from its softness, smoothness, and depth, is valued as an article of commerce, and about 8000 skins are annually imported from the Fur Countries where the animal is very abundant, especially on the wooded districts.

Foxes of various gradations of colour called Cross Foxes are very common in the Fur Countries of North America; these are considered by Dr. Richardson to be only varieties of the Red Fox, and this is the opinion of the native hunters. A rarer variety is the Black or Silver Fox, so valuable for its fur. Dr. Richardson says, that seldom more than four or five of this variety are taken in a season at one post, though the hunters as soon as they discover the haunts of one use every art to catch it. This fox is black, with the tips of the hairs silvered.

As a marked example of a section of the genus *Vulpes*, the Arctic Fox (*Vulpes lagopus*) requires a passing notice.

Arctic Fox (*Vulpes lagopus*).

This species is common to the regions of the Arctic Circle in the Old and New World. It is the *Isatis* and Arctic Fox of Godman, *Stone Fox* of authors.

The Arctic Fox is small, sharp-nosed, thickly covered with dense white fur in winter, which in summer is replaced by shorter hair more or less tinged with brown, and blueish or brownish gray at the roots. The food of this species consists of eggs, blubber, carrion, and also, as Dr. Richardson asserts, lemmings of different species. In its habits it is extremely cleanly. It never soils its habitation, nor has it any unpleasant smell. Breeds on the sea-coast, chiefly within the Arctic Circle. It is very unsuspicious and easily taken by traps, even, as it is stated, when baited in its presence. Captain Lyon, R.N., received fifteen from one trap in four hours. It is gregarious, forming burrows in sandy spots, twenty or thirty together. Dr. Richardson saw one of these fox villages on Point Turnagain, in lat. 68½°. It soon becomes tame in confinement, and is eager to hide its food as soon as it obtains it, even when there seems no danger of losing it. Snow is the material generally used for this purpose, and when piled over the food is forcibly pressed down by the nose. 'I frequently observed my dog-fox,' writes Captain Lyon, 'when no snow was attainable, gather his chain into his mouth, and in that manner carefully coil it so as to hide the meat. On moving away, satisfied with his operation, he, of course, had drawn it after him again, and sometimes with great patience repeated his labours five or six times, until in a passion he has been constrained to eat his food without its having been rendered luscious by previous concealment. Snow is the

substitute for water to these creatures, and on a large lump being given to them, they break it in pieces with their feet, and roll on it with great delight. When the snow was slightly scattered on the decks, they did not lick it up, as dogs are accustomed to do, but by repeatedly pressing with their nose, collected small lumps at its extremity, and then drew them into the mouth with the assistance of the tongue.' The same author gives the following account of the sagacity of the same dog-fox:—'He was small and not perfectly white; but his tameness was so remarkable, that I could not afford to kill him, but confined him on deck in a small hutch with a scope of chain. During the first day, finding himself much tormented by being drawn out repeatedly by his chain, he at length, whenever he retreated to his hut, took this carefully up in his mouth, and drew it so completely after him, that no one who valued his fingers would endeavour to take hold of the end attached to the staple.'

Geographical Distribution. — 'The highest northern latitudes throughout the winter. The young generally migrate to the southward late in the autumn, and collect in vast multitudes on the shores of Hudson's Bay: they return early the following spring along the sea-coast to the northward, and seldom again leave the spot they select as a breeding-place.' (Captain James Ross.) 'Their southern limit in North America appears to be about lat. 50°. They are numerous on the shores of Hudson's Bay, north of Churchill, and are found at Behring's Straits; but the brown variety (*fuliginosus*) is the more common in the latter quarter.' (Dr. Richardson.) The Doctor continues thus:—'Towards the middle of winter they retire to the southward, evidently in search of food, keeping as much as possible on the coast, and going much further to the southward in districts where the coast line is in the direction of their march. Captain Parry relates that the Arctic foxes, which were previously numerous, began to retire from Melville Peninsula in November, and that by January few remained. Towards the centre of the continent, in lat. 65°, they are seen only in winter, and then not in numbers; they are very scarce in lat. 61°, and at Carlton House, in lat. 53°, only two were seen in forty years. On the coast of Hudson's Bay however, according to Hearne, they arrive at Churchill, in lat. 59°, about the middle of October, and afterwards receive reinforcements from the northward until their numbers almost exceed credibility. Many are captured there by the hunters, and the greater part of the survivors cross the Churchill river as soon as it is frozen over, and continue their journey along the coast to the Nelson and Severn rivers. In like manner they extend their migrations along the whole Labrador coast to the Gulf of St. Lawrence.'

There are certain forms of *Canidæ* peculiar to Asia and Africa, which certainly cannot with propriety be referred, as they have been by most naturalists, to the genus *Vulpes*. Col. Hamilton Smith divides them into the following generic groups:—

I. *Cynalopex*, or Dog Foxes.—These, he says, may be considered as jackals with long tails, or foxes with diurnal eyes: they all appear to have furred feet; the ears are largely developed, and there is a black spot at the base of the tail, covering a gland: they feed on insects as well as birds. Examples, *Cynalopex corsac*, the Corsac, a very small species with open pointed ears; general colour yellowish gray, with limbs of a deeper buff; lives in large communities, burrows, prowls in packs, feeds upon birds and birds' eggs, conceals superabundant food, utters a kind of barking, and is possessed of a very offensive odour. The Corsac resides chiefly in the Great Deserts of Tartary, between the rivers Jaick, Emba, and the sources of the Irtish. It is said never to drink. (H. Smith.)

Cynalopex kokree (*Canis kokree*, Col. Sykes, in 'Proceeds. Zool. Soc.;'), *Kokree* of the Mahrattas, the Kokree. Allied to the Corsac. — Locality, the Deccan, in Hindustan.

Cynalopex chrysurus, Gray, the Fulvous-Tailed Dog-Fox.—Specimen in British Museum. Locality, Hindustan.

Cynalopex pallidus (*Canis pallidus*, Rüppel), the Pale Dog-Fox.—Rüppel found this animal in Darfur and Kordofan, burrowing under ground, and hunting by night; it was seldom caught in traps.

Cynalopex insectivorus (*Canis Bengalensis*, Shaw; *Bengal Fox*, Pennant; *Isatis*, Buffon), the Isatis.—This species is closely allied to the Corsac. Locality, Hindustan. 'As this animal is said to exist also in Nepaul and Tartary, it may be identical with *Cynalopex Karagan*, which is known only from a description communicated by Dr. Pallas to Mr. Pennant. It is a small species very common in the deserts of the Kerguise and Great Tartary.' (H. Smith.)

Cynalopex Turcicus, the Turkish Dog-Fox.—This species is described by Col. H. Smith from a specimen in the Museum of Paris. 'From the dense clothing of this animal, it doubtless inhabits a cold region; and if it be found in Turkey, the mountains of Natolia and Armenia alone can suit it.'

II. *Megalotis*, the Fennec or Zerda.—Eyes circular. Ears greatly developed, and the folds at the edges double or treble. 'Such a structure cannot well be given without a corresponding effect; and if we compare it with the same forms in bats, whose exquisite hearing and singular power of diversified perceptions are known to belong to their enlarged and complicated ears, we may fairly presume the *Megalotes* likewise enjoy distinct faculties and increased sensibilities by means of these organs. For this purpose they have the cerebral chamber considerably larger than in other canines of equal size; the auditory apparatus is immensely developed. The skulls are destitute of the central ridge where the temporal muscles are inserted, and the jaws have no great powers of action. Besides the diurnal eyes, the great expanded ears, and the spot on the tail, this group is farther distinguished by the soles of the feet being covered with hair—a provision the more remarkable, because all the known species of this group belong to tropical latitudes. Their teeth, though the same in number with the rest of the *Canidæ*, indicate that besides fruit, honey, and birds' eggs, they are prone to feed on insects:

this propensity is perhaps facilitated by their hairy feet making no noise and causing no concussion of the earth while in pursuit of their prey. They burrow in the sandy deserts of Africa, and about the roots of date palms.' In sandy wastes hair-covered soles give stability of tread.

Megalotis famelicus (*Canis famelicus*, Krætschmer; *Sabora* of the Arabs), the Anubis Zerda, a small species found by Rüppel in Kordofan, towards Nubia. It burrows and hunts birds and small quadrupeds, as jerboas, &c. Professor Krætschmer is inclined to believe that the figures which are taken for jackals on Egyptian temples and in the catacombs of Thebes are intended to represent the present animal.

Megalotis Caama (*Canis* [*Vulpes*] *Caama*), the Caama Fennec, the smallest of the South African foxes, according to Dr. Smith. Habits diurnal; feeds upon eggs; is an object of solicitude to ostriches, who watch the animal when the laying season has commenced. When the Caama has obtained an egg of large size, he is stated to roll it in the manner of the Suricate (*Ryzæna*), until by encountering a stone it is broken, and its contents thus become accessible.

Megalotis Zerda (*Zerda* or *Durda* of the natives of Nubia), the Fennec of Bruce.—This small and elegant animal appears to extend from Nubia to Caffraria. Dr. Rüppel obtained his specimens about Ambukol, and in the desert of Korte, while Sparrmann recognised Bruce's Fennec in South Africa. This animal burrows in the sand, and, if Bruce is to be believed, also climbs trees, but there might have been in his notes some confusion between the habits of the little Fennec and some species of Galago.

III. *Agriodus*.—This genus is removed from *Megalotis* on good grounds. Agreeing with the *Megalotides* in most general features, it differs from them and all the known *Canidæ* by having in the upper jaw (on each side) 7 molars, and in the lower 8. Of these, three are false molars, and four have the crown formed into real grinders; below, the false molars are four; then follows a small imperfect laniary, and behind it three tubercular teeth; the canines are slender, and, together with the incisors, inclined forwards. The skull has also its peculiarities of form and outline.

Agriodus auritus, H. Smith (*Megalotis Lalandii, Canis Megalotis*), Lalande's Zerda.—Habits, those of the *Megalotides*. Locality, South Africa. A similar if not the same species is suspected by Col. H. Smith to exist in Abyssinia. ('Naturalist's Libr.' vols. ix. and x.)

Fossil Foxes.

Dr. Buckland, in his 'Bridgewater Treatise,' figures a fox as recent and fossil among the mammalia of the first period of the Tertiary series (Eocene of Lyell), and mentions the fox in his list of vertebral animals found in the gypsum of the Basin of Paris. The most complete fossil specimen is that which was found in the quarries of Œningen, near Constance, overlaid by upwards of twenty feet of marl, limestone, and building stone, brought to England by Sir R. I. Murchison, then president of the Geological Society of London, who describes the deposit in the 'Geological Transactions' (vol. iii., 2nd series), and gives excellent figures of the fox, which is accurately described in the same paper by Dr. Mantell. Sir R. I. Murchison's observations lead him to think that the Œningen formation is exclusively of ancient lacustrine origin, but that it is entirely posterior to the molasse of Switzerland. Birds, reptiles, fishes, insects, crustaceans, conchifers, mollusks, and plants, a leaf of one of the latter being scarcely distinguishable from the *Acer villosum* of Nepaul, occur in the Œningen beds. The other mammalia found there were Rodents (see Cuvier, 'Ossem. Foss.,' tome v. partie i. p. 61–64); one is in the British Museum, and has been subsequently figured and named by Mr. König *Ancema Œningensis*; and Professor Sedgwick brought one from the quarries which M. Laurillard referred to the genus *Lagomys*. It is worthy of notice that lemmings are said to be the principal food of the Arctic Fox, and that Captain James Ross found in the burrow of one great numbers of the two species of lemming, and the bones of hares, fish, and ducks, in great quantities, as well as several ermine. Sir R. I. Murchison's fox is stated to be scarcely distinguishable from the common fox. One slab of this fine fossil is in Sir R. I. Murchison's possession: the other half he presented to the Geological Society of London, in whose museum it now is.

FOX, RICHARD, bishop of Winchester, was born of poor parents, towards the middle of the fifteenth century, at Ropesley, near Grantham, in Lincolnshire. Through the friendship of Morton, bishop of Ely, a zealous Lancastrian, Fox was taken into the earl of Richmond's service, aided him in his arrangements for the descent upon England, and was made by him, as Henry VII., successively privy councillor, bishop of Exeter, keeper of the privy seal, secretary of state, bishop of Bath and Wells, of Durham, and of Winchester. During the reign of Henry VIII. Fox was thrown into the back ground, first by the earl of Surrey, and next by Wolsey, whom he had himself introduced to court to oppose the earl. He returned to his diocese in 1513, spent the rest of his life in works of munificence and piety, and died in 1528.

FOX, JOHN, commonly called the Martyrologist, from the work by which he is principally known, was born at Boston, in Lincolnshire, in 1517. He was entered of Brazenose College, Oxford, in 1531, and elected a Fellow of Magdalen College in 1543. Having applied himself with great earnestness to the study of divinity, he became a convert to Protestantism, and was deprived of his fellowship for heresy in 1545. His father had left him some property, which was withheld from him, on the same ground, by a second husband whom his mother had married, and he was reduced to great distress. At last he obtained the situation of tutor in the family of Sir Thomas Lucy of Charlecote, near Stratford, in Warwickshire. This place however he left after some time, and was again subjected to many disappointments and hardships, before he was taken into the house of Mary duchess of Richmond, to instruct the children of her brother, the unfortunate earl of Sur

rey. After the accession of Edward VI. Fox was appointed to another fellowship, but he was an exile in the time of Mary until her death; he then returned to England, where his former pupil, now duke of Norfolk, settled a pension on him for life. A prebend in the church of Canterbury was also given to him by Cecil. Fox never would subscribe to the articles of religion as finally settled, and this prevented his ever attaining any higher dignity in the church. He may be considered as having belonged properly to the sect of the Puritans.

Fox died in 1587. He was the author of numerous works; but the only one that is now remembered is his 'Book of Martyrs,' of which a small part was first printed at Strasburg in 1554; the complete work was first published in England in 1563. Whatever mistakes may have crept into this book, the honesty of the author remains unimpeached.

FOX, GEORGE, founder of the Quakers, was born at Drayton, in Leicestershire, in July, 1624. He was apprenticed to a shoemaker, but, moved by religious feeling, he left him to wander about like a hermit, and when brought back by the persuasions of his friends, he soon resumed the same habits. He had found, he said, that an university education was no qualification for a minister, but that all depended on the anointing of the Spirit; and, as for churches, that God did not dwell in temples made with hands. He would, says Neal, sometimes sit in a hollow tree all day, and walk about the fields at night, like a man governed with a deep melancholy. At last he ventured to teach, and, at the same time, discontinued all outward marks of respect, as by taking off his hat, for instance. This, and the refusal to take any oath, involved Fox and his followers in persecution and distress. From 1648 till within a few years of his death, his life was made up of travel, disputation, and imprisonment. He visited the continent several times, our American colonies in 1671, and the Netherlands in 1677 and 1681. Quaker meetings however were first established in Lancashire in 1652. The term Quaker arose thus: Fox was brought before one Justice Bennet, at Derby, in 1650, 'who,' says Fox, 'was the first that called us Quakers,' because I bid them *tremble at the word of the Lord.* He died in London in 1691.

FOX, CHARLES JAMES, born on the 24th of January, 1749, was the third son of the Right Hon. Henry Fox, who, in 1763, was created Lord Holland.

From a preparatory school at Wandsworth Fox was sent at the age of nine to Eton, and soon distinguished himself by the rapidity of his progress. His education was interrupted by a three months' trip to Paris and to Spa, in which he was accompanied by his father; to whose misplaced indulgence, it is said, during this tour, is to be traced the devotion to the gaming table which, ever after, was the principal alloy of Fox's happiness. In 1764 he entered at Hertford College, Oxford, and pursued learning and pleasure in turn. He left Oxford in 1766, went abroad, and having passed two years chiefly in Italy, returned to England in 1768. In his absence, and before he was yet of age, he had been elected member of parliament for Midhurst, in Sussex.

Fox took his seat in parliament as a supporter of the duke of Grafton's ministry. In 1770, when the duke of Grafton was succeeded by Lord North as prime minister, Fox was appointed junior lord of the admiralty. He resigned this situation two years after, in consequence of some misunderstanding with Lord North; but in less than twelve months he was brought back into the ministry as one of the lords of the treasury. In February of the next year he was again dismissed from his situation, through his suddenly bringing forward an amendment, which Lord North felt compelled to support, and which put him into a minority. A few days after, as Fox was sitting in the House of Commons on the ministerial bench, he received the following laconic note:—'Sir, His Majesty has thought proper to order a new commission of the Treasury to be made out, in which I do not perceive your name. North.' In a very short time Fox was in opposition. It must be remembered, however, that so long as Fox was a ministerialist he had by no means concurred on all occasions in the opinions of his colleagues, nor, when he differed, had he abstained from expressing and acting upon his own opinions. Mr. Burke also now begun to have considerable influence over him.

It was on Lord North's Boston Port Bill, the measure that led to the American Revolution, that Fox first opposed the minister. He took his stand, first, on the principle that the American colonies ought not to be taxed without being represented; and, secondly, on the inexpediency of endeavouring to wring taxes from them by force, and at the risk of rebellion. In the beginning of 1780 Mr. Burke brought forward his plan of economical reform, which was zealously supported by Fox, and by petitions pouring in from all parts of the kingdom for a reduction of the public expenditure. On the 6th of April resolutions were carried against the influence of the crown and in favour of an inquiry into the expenditure of the country and of a diminution thereof. On the 27th of February, 1782, a motion of general Conway's for the discontinuance of the war was carried by a majority of 19. On the 19th of March the ministers resigned. Fox now was the leading member of opposition, and exceedingly popular. At the general election in 1780 he had been returned for Westminster, in spite of every court effort and every trick of intrigue and intimidation. On the formation of the new ministry under Lord Rockingham, Fox was appointed secretary of state for foreign affairs. He instructed Mr. Grenville, the plenipotentiary at Paris, to propose to the American agents there the independence of the United States of America, to which the king's assent had been obtained. But the ministry contained Lord Shelburne, who had been introduced by the king, and who did his best to thwart Fox's measures of pacification. He was even discovered by Fox carrying on a clandestine communication with Dr. Franklin. Fox now made up his mind to resign. He did so upon the death of Lord Rockingham, which took place but four months after

the formation of the ministry, which was then broken up.

In the new or Shelburne ministry, Mr. Pitt who had fought by the side of Fox was included, whilst Lord North, who had been opposed by him, was not. Peace or war with America no longer dividing Fox and Lord North, they united in opposition, and formed the famous Coalition. The ministry were overthrown in February 1783, and a new one under the Duke of Portland formed, with Lord North and Fox as secretaries of state. This too soon fell under the influence of court intrigue. The principal measure which it attempted was Fox's East India Bill, which went, the king thought, to diminish the influence of the crown for the aggrandizement of the ministers, and who accordingly sent a message, through Lord Temple, to all noblemen to whom his personal influence extended, that he should consider those who voted for the bill in the House of Lords as his enemies. The ministers were consequently left in a minority. The next day they were dismissed. A new ministry was formed almost immediately under Mr. Pitt.

The new ministers, notwithstanding the adverse majority, who sought to prevent a dissolution by extraordinary measures, finding the king would not accept their twice-offered resignation, persevered, dissolved the house, and Fox re-entered it as member for a Scottish borough. He was next elected for Westminster, but through the party and personal animosity of Mr. Pitt and his friends, twelve months elapsed before he was acknowledged the proper member. The question of Mr. Hastings's Indian administration was brought forward in 1788 by Mr. Burke, and Fox took a very active part. In 1788 the king's illness rendered necessary a regency; and while Mr. Pitt contended that it was for the two houses of parliament to appoint the regent, Fox maintained that the regency belonged of right to the Prince of Wales. The king's speedy recovery rendered it unnecessary to bring the question to a decision.

In 1789 and later Fox distinguished himself by the support of a motion for the repeal of the Test and Corporation Acts. On the dissolution of parliament in 1790 he was again returned for Westminster.

The discussions arising out of the question of the French Revolution, replete as they are with public interest, are also important in a life of Fox, on account of their having led in May 1791 to a termination not merely of his political alliance but also of his friendship with Mr. Burke. In vain Fox pressed upon Mr. Burke the claims of a friendship of five-and-twenty years' duration. Burke remained relentless, and the breach was never made whole.

Fox distinguished himself during the same session by his support of Mr. Wilberforce's motion for the abolition of the slave trade, and by the introduction of a bill for the amendment of the law of libel. From the latter part of 1792 to 1797 his efforts were unceasing, first to prevent a war with France, and afterwards, when his warnings had been of no avail, and it had been entered into, to bring it to a close. We must mention also the support which in 1793 he gave to Mr. (afterwards Earl) Grey's famous motion for parliamentary reform; his eloquent advocacy in 1794 of the cause of Muir and Palmer, the Scottish martyrs, his indefatigable opposition to the treason and sedition bills of 1795, and his attempt to procure attention to the state of Ireland, and to the grievances of the Irish Catholics. Pitiable were the minorities that supported him in this course; so in 1797, when the parliamentary question was again before the house, he announced his resolution to discontinue his attendance at the house, seeing that he and his friends were destitute of power to carry out their views. He occupied the five years of his retirement with literary pursuits. In 1802 he paid a visit to Paris, principally for the purpose of collecting documents for his projected historical work, the 'History of the Reign of James II.' During his stay in Paris it is said that he was treated with marked attention by Napoleon.

At length Mr. Pitt's cabinet was broken up by the question of Catholic emancipation; and Mr. Addington's succeeded, who at once commenced negotiations for peace with France. Fox then reappeared to express his joy at that prospect. But peace came not, and Mr. Addington resigned. Pitt and Fox would now together have formed a ministry, but the king was unchangeably hostile to the latter, and Mr. Pitt did the best he could with the wreck of the Addington ministry. Still peace came not. On the 23rd of January, 1806, Mr. Pitt's death dissolved the ministry; and in the new one which was formed under Lord Grenville, Fox was appointed secretary for foreign affairs. His life was spared only for seven months longer; but during this short period he did much towards the abolition of the slave-trade, which had ever been one of the objects that he most cared for, and he entered zealously into negotiations for peace with France, which it was a heavy misfortune to his country that his death did not allow him to complete. He died on the 13th September, 1806, in the 58th year of his age, of water on the chest.

Though Mr. Fox was not, in the full and strict sense of the term, a philosophic statesman, he came nearer to it perhaps than any other English statesman, not even excepting Mr. Burke. Sir James Mackintosh has said of him, as an orator, 'that he was the most Demosthenean speaker since the days of Demosthenes.' Fox's Speeches were published in six volumes in 1825. The fragment which he left of his projected history of the reign of James II. was published in 1808, with a preface by Lord Holland.

FOX ISLANDS. [Aleutian Islands.]

FOXGLOVE. [Digitalis.]

FOY, MAXIMILIEN-SEBASTIEN, one of the best, if not the first, of the political orators that have appeared in France since the establishment of a constitutional charter, was born in 1775, at Ham, in Picardy. Foy displayed from his earliest boyhood remarkable talents and great application. Having completed his course of studies at the college of Soissons, he passed to the military school of Lafere, and in 1790 entered the army as a second lieutenant of artillery. He served with great credit in various campaigns during the wars of the

Revolution; and by 1798 had risen to the rank of colonel. Being a sincere republican, he voted against the election of Bonaparte to the imperial dignity. Notwithstanding that circumstance, Napoleon employed Foy, but left him a long time without promotion. His services however in Portugal, where he fought in many battles and received several wounds, were acknowledged by his promotion to the rank of lieutenant-general. He was employed at the Restoration by the Bourbons, but joined Napoleon after his landing from Elba, and fought bravely at Waterloo, where he was again wounded. In 1819 Foy was chosen deputy of the department of Ain, and the talents which he displayed in the new career now opened to him surpassed the most sanguine expectations of his friends. With great eloquence and indomitable resolution he opposed the reactionary party and supported liberal principles. He died in 1825. One million of francs was raised for his family, who were poor.

Foy left two volumes of speeches, and a 'History of the Peninsular War,' a work which is much esteemed, but unfortunately was not completed.

FOYLE and LOCH FOYLE. [DONEGAL; LONDONDERRY.]

FRACASTO'RO, HIERO'NYMUS, one of the most learned men of his time, as well as one of the best modern Latin poets, was born at Verona, in 1483. From his earliest youth he applied himself to the study of the sciences, particularly to medicine, and he became professor of logic at the university of Padua when he was only nineteen years old. Fracastoro died in 1553. Ramusio, who owed to Fracastoro the ideas as well as many materials for his collection of the 'Navigazioni et Viaggi,' erected a brass statue to his memory at Padua. Julius Cæsar Scaliger was so great an admirer of Fracastoro's poetical talents that he wrote a poem in his praise, entitled 'Aræ Fracastoriæ.' The principal work of Fracastoro is, 'Syphilidis, sive Morbi Gallici, libri tres,' published at Verona, 1530, in 4to.; at Paris, 1531 et 1539, in 8vo. and in 16mo.; Basel, 1536, in 8vo.; Lyon, 1547, in 12mo.; Antwerp, 1562 and 1611, in 8vo.; London, 1720, in 4to., and 1746 in 8vo.; Padua, 1744, in 8vo. It was translated into French by Maquer et Lacombe, Paris, 1753, in 12mo.; into Italian by Antonio Tirabosco, Verona, 1739, in 4to.; by Pietro Belli, Naples, 1731, in 8vo.; by Sebastian degli Antonii, Bologna, 1738. The best Italian translation is that of Vizentio Benini de Colonia, published, with the complete collection of Fracastoro's works, at Padua, 1739, in 4to. The complete works of Fracastoro appeared for the first time at Venice, 1555, in 4to., and they were reprinted in the same town in 1574, 1584, 4to.; Lyon, 1591; Montpelier, 1622; Geneva, 1621, 1637, and 1677. The beautiful poem of Fracastoro entitled 'Aleon, sive de Cura Canum Venaticorum,' which many critics consider as scarcely inferior to the 'Syphilis,' appeared only in the editions of his complete works, published after the 16th century, and it seems to have never been separately printed. (For further particulars about Fracastoro and his works, see Tiraboschi's *Storia della Litteratura Italiana*; Ginguené, *Histoire de la Littérature Italienne*; and Roscoe's *Life and Pontificate of Leo the Tenth.*)

FRACTIONS, COMMON and DECIMAL. By a fraction is meant, in the first instance, a part of any magnitude. Thus, 'three and a fraction' means three units and a part of a fourth. The next meaning of the term confines fractions, in an arithmetical point of view, to the *aliquot* parts or *submultiples* of the unit; which unit must therefore be divided into a number of equal parts, of which parts a certain number is to be taken.

A fraction is thus denoted: $\frac{a}{b}$ means the quantity obtained by dividing a unit into b equal parts and taking a of those parts. If a be greater than b, it will obviously be necessary to divide more units than one, each into b equal parts, until enough have been subdivided to furnish the a parts required. It was usual, in English works on arithmetic, to call fractions in which a is less than b *proper* fractions, and all others *improper* fractions. This absurd distinction is now beginning to be abolished. In the preceding fraction a is called the *numerator*, and b the *denominator*.

The fundamental property of fractions on which all others depend, is this—that no fraction is changed in value by multiplying or dividing both its terms by the same number or fraction, that is—

$$\frac{a}{b} = \frac{ma}{mb}$$

whatever may be the values of a, b, and m.

In practice it is convenient to employ fractions having either the same denominators, or which may easily be reduced to others of equal value having the same denominators. The numbers 10, 100, 1000, &c., suggests themselves for this purpose: indeed it may be immediately seen that the ordinary system of decimal numeration may be extended so as to allow of a representation of such fractions. If we consider the number 11111, we see that for every step which we make to the right, we find a unit which is only the tenth part of the preceding unit. Place a point at the unit's place (to mark its position), and let the same method of valuation be carried further. Then in 11111.1111, the first 1 after the point should stand for one-tenth of the preceding, or one-tenth of a unit; the second for one-tenth of a tenth, or one-hundredth, and so on. The fundamental theorem of decimal fractions, in this view of the subject, is that which shows, for example, that 12.2345 (defined to mean 1 ten, 2 units, 2 tenths, 3 hundredths, 4 thousandths, and 5 ten-thousandths) is the same as 122345 ten thousandths; or that all the number, such as it would be if the units' column were on the right, may be taken as a numerator, and the denomination of the right hand figure as a denominator. Thus—

$$65.483 \text{ or } 60 + 5 + \frac{4}{10} + \frac{8}{100} + \frac{3}{1000}$$

is $\frac{60000}{1000}+\frac{5000}{1000}+\frac{400}{1000}+\frac{80}{1000}+\frac{3}{1000}$

or $\frac{65483}{1000}$

It is common to say that a result is true to a certain number of places of decimals when any alteration of any place would make it further from the truth. Thus, the diameter of a circle being unity, the circumference lies between 3.1415 and 3.1416, but nearer to the latter; whence the same circumference, true to four places of decimals, is 3.1416. Similarly 62.13299, taken true to two places, is 62.13; to three, 62.133; to four, 62.1330. Again, .625, taken true to two places, might be either .62, or .63; but the latter is generally taken.

For subjects closely connected with the theory of fractions, see RATIO; PROPORTION; INCOMMENSURABLE.

FRACTIONS, CONTINUED. A continued fraction is one which has a fraction in its denominator, which again has a fraction in its denominator, and so on: such as

$$\cfrac{1}{2+\cfrac{3}{7+\cfrac{6}{1+\cfrac{2}{3}}}}$$

FRACTIONS, VANISHING. This term is applied to fractions in cases where a supposition is made which destroys both numerator and denominator at the same time. Thus—

$$\frac{x^2-1}{x-1}, \quad \frac{\log. x}{x-1}, \quad \frac{ax-a}{b^x-b},$$

are fractions which all assume the form $\frac{0}{0}$ when $x=1$: that is, though for any other value of x they represent operations of ordinary arithmetic, yet in the particular supposition that x is unity, they all end in a direction to find out how many times nothing is contained in nothing. The method of the mathematician is to substitute for the vanishing fraction the value to which it approaches as the numerator and denominator diminish. We have not space to explain this further, or to enter on the discussion which this subject has undergone.

FRACTURE. Injuries complicated with the breaking of a bone are called *Fractures*.

The comparative importance of such accidents depends in the first place upon that of the bone which is broken. The most dangerous fractures in this point of view are those of the vertebræ and skull, which inclose organs immediately essential to life and extremely susceptible of injury.

Fractures are said to be *transverse* or *oblique*, a distinction of great practical importance. In the first or *transverse* variety, the bluntness of the ends of the broken bone in some measure preserves the contiguous soft parts from laceration at the time of the accident; it also opposes a considerable obstacle to the displacement which arises afterwards from muscular contraction; but it chiefly conduces both to the diminution of present suffering and to the prosperous event of the case, by facilitating the speedy and perfect restoration of the displaced bone to its proper situation, and its steady retention, when restored, by mechanical means.

On the other hand, as most of the bones liable to fracture are cylindrical, or present flattened surfaces meeting in as many solid angles, if they be broken obliquely, the ends of the bone will be sharp-edged or pointed: hence they are generally separated from each other to a much greater extent than is usual in transverse fractures, and there is not only much more suffering from the laceration of sensitive parts and from portions of them being included and pressed between the broken surfaces, but great difficulty is often experienced in disentangling the ends of the bone, and bringing them into close apposition; and still more in retaining them, from their tendency to slip past each other during the spasmodic and powerful contractions of the wounded and irritated muscles. The result of such fractures is often unsatisfactory, in spite of the utmost care and skill; and some distortion and shortening of the limb is inevitable in severe cases.

Surgeons distinguish several other kinds of fracture. When a bone is crushed, or fissured in more than one direction, so that portions of it are detached from the rest, the fracture is said to be *comminuted*. From the facility generally experienced in replacing the bone, or at least in straightening and supporting the limb in these cases, they often end better than apparently less serious oblique fractures.

A bone may of course be broken in the situation of a joint; or, if the fracture occur at some distance, a fissure may extend longitudinally into one of these cavities. This circumstance is a very important aggravation of the injury. The synovial membranes which line the joints are peculiarly impatient of irritation, and when they become inflamed, the constitutional disturbance is often considerable, and the attendant, or, as it is called, the *symptomatic* fever, is of a very acute type.

Fracture is sometimes complicated with dislocation. If a bone be dislocated as well as broken, it may be difficult or impossible to carry into effect the measures which are necessary for the satisfactory treatment of either injury, and the result is permanent distortion and crippling of the limb.

If the injury of which we are treating be confined to the bones and the parts immediately around them, the fracture is said to be *simple*; but if the bone be protruded through the skin, or an external wound otherwise inflicted communicate with the interval between the broken surfaces, the fracture is said to be *compound*. This is a much more serious circumstance than might at first sight have been supposed. It is often followed by most severe inflammation, and death is not unfrequently the consequence.

In fracture the nature of the accident is generally obvious enough, but where there is any doubt, it may be removed by attending to the

grating sound, or the sensation communicated to the touch occasioned by slightly moving the broken ends of the bone against each other. This symptom is called *crepitation*.

The principles of treatment are, in the first place, to soothe by all possible and prudent means the muscular irritation and spasm which are the immediate and most urgent consequences of a recent fracture.

When the relaxing rigidity of the muscles will permit, which may not be for some hours or days, the bone is to be restored as nearly as possible to its proper situation by the gentle application of force in any required direction.

When the limb is reduced, it should be placed in *splints*, which are thin pieces of wood or other material of the requisite firmness and length, and suitably shaped and hollowed out to fit evenly without making undue pressure upon prominent points, such as the ankle. The skin is to be protected by folds of linen or thin soft pads a little wider than the splints, which are also useful to prevent them from slipping. When everything is properly arranged as to position, the splints should be bound upon the limb with a moderate degree of pressure; and it is right to remove and readjust them occasionally, in order to detect and rectify any deviation from the correct line of the bone that may arise or become apparent as the swelling subsides.

In fracture of the ribs it is sufficient to apply a broad belt or bandage to prevent them from alternate depression and elevation in the act of breathing, which can be carried on sufficiently well by the diaphragm alone.

Union of Fractured Bone.—The process by which fractured bones are united is generally uninterrupted in simple cases, if the constitution be good, and the accompanying contusion not very considerable. The extravasated blood is soon absorbed, and the swelling and inflammation subside. The interior lacerations heal, and the soft parts round the ends of the fracture become consolidated with the periosteum, or fibrous investment of the bone, which swells and unites at the torn edge. In this consolidated mass, which forms a soft case for the bone for some distance above and below the fracture, but is thickest just at that point, particles and spicula of bone are gradually deposited, till at length it becomes rigid and firm, holding the ends of the bone in close contact, and preventing them from slipping away from each other, like the slider of a parasol. At length the patient finds the strength of his limb restored, and conscious of the change, can no longer be persuaded to refrain from using it. After a certain period, which has been differently stated —perhaps six or seven months in the case of a large bone—the fractured ends become firmly adherent by the deposit of bony matter between them; the exterior case becomes absorbed, and the cure is complete, the bone being rather thicker and generally somewhat stronger and more solid in the situation of the fracture than before the accident. The whole of this process is much quicker in infants and children than in adults, and somewhat more slow in advanced periods of life than in the middle age. Taking all ages, it ranges, as we have said, from two to eight or ten weeks—speaking, of course, of the period at which the limb becomes firm enough to perform its functions.

FRACTURE, in Mineralogy, means the irregular surface which appears when a mineral is broken in any other directions than the planes of cleavage, so that surfaces do not constitute a *cleavage*. The kinds of fracture are determined by the appearance presented by the surface, and are compact, fibrous, radiated, or foliated.

FRAGRARIA. [Strawberry.]

FRAISE is a row of palisades placed in a horizontal or inclined position on the exterior of a rampart of earth, in order to increase the difficulty of passing over it at the time of an assault.

FRAMLINGHAM. [Suffolk.]

FRANCE, the most westerly of the kingdoms of continental Europe with the exception of the Spanish Peninsula. Its form is very compact. It is comprehended between 42° 25′ and 51° 5′ N. lat., and 8° 17′ E. long., and 4° 46′ W. long. The greatest length from S.E. to N.W. is about 660 miles, and the greatest breadth, N.E. to S.W., about 615 miles. The area, with Corsica, is about 204,711 English square miles; without Corsica, it is about 200,925.

Coast, Islands, and Frontier.—The N.N.W. coast, which lies opposite to England, extends about 480 miles, and is generally irregular in its outline. It forms two large bays, separated from each other by the peninsula of Cotentin. Of these bays, that which is the most easterly is divided into two subordinate bays by the rounded projection of the coast about Fécamp and St. Valery. About Cape Gris-Nez there are cliffs, and west of the mouth of the Seine the shore is skirted by rocks. The second of the principal bays is that of St. Malo, the coasts of which are mostly rocky. The remainder of the coast of the ocean faces the south-west and west, and extends about 450 miles; the northern half is for the most part rocky, but the southern half, bounded by the Bay of Biscay, is low and sandy.

The coast of the Mediterranean bounds France for 260 miles, and forms the two bays of Lions and Genoa, separated by the coast about Toulon. Eastward of Toulon the coast is more generally rugged than westward of the same point, and this part of the coast has many small inlets.

Along the coast are several islands. In the Manche, or English Channel, are Guernsey, Jersey, Alderney, and Sark, which belong to the English crown; the islands of Brehat, les Sept Iles (the Seven Islands), and the Isle of Bas. At the western extremity of France are the isles of Ouessant (Ushant) and along the remainder of the coast of the ocean are the isles of Glenan, Groaix, Belle-île, Noirmoutier, Ile-Dieu, Ré, Oleron, and others of less importance. In the Mediterranean we have the islands of Hières and Corse, or Corsica.

The land frontier of France is, for the most part, formed by great natural barriers. On the southern or Spanish frontier are the Pyrenees. On the south-east, the frontier is formed by the

Alps and the Jura towards Sardinia and Switzerland. On the east the Rhine separates France from Baden. The remaining part of the frontier borders on Prussia and Belgium. The land frontier, from Nice to Dunkirk, measures roughly about 720 miles.

Mountains and Rivers.—The loftiest mountains in France are those on the Sardinian and Spanish frontiers, the Alps and Pyrenees. The highest of the French Alps is Mount Olan, 13,819 feet; of the French Pyrenees, Vignemale, 11,000 feet; and of the French Jura, Mount d'Or, 4797 feet. The Cévennes are separated from the Pyrenees by a wide valley, through which the great canal of Languedoc runs. Mont Mezen, the highest of the Cévennes, is 5820 feet high, and Mont Gerbier de Joncs, at the source of the Loire, 5125. The mountains of Auvergne rather surpass these in height. The Côte d'Or of Burgundy connects the Cévennes with the Vosges, whose branches extend to the south-east so as to unite with the Jura, and whose wild and wooded steeps form the western boundary of the valley of the Rhine. A range of heights extends N.W. from about Langres to Cape Gris-Nez, separating the streams which belong to the great system of the Rhine from those which belong to the river systems of central France. Various minor ranges separate from each other the basins of the Seine, the Somme, the Loire, the Garonne, and the Adour.

The mountains and ridges run in such directions as to separate France into three great slopes, the western, the north-eastern, and the south-eastern. The western slope includes the basins of the Adour, the Garonne, the Charente, the Loire, the Vilaine, the Orne, the Seine, the Somme, and a number of others of less importance. The north-eastern or Rhenish slope comprehends part of the basins of the Escaut or Schelde, the Meuse or Maes, the Moselle, and the Rhine; but only a comparatively small part of the course of each of these rivers belongs to France. The south-eastern or Mediterranean slope comprehends the basin of the Rhône, and of one or two other streams which are too small to require notice. The following are about the lengths of the chief rivers of France:—

	Miles.		Miles.
Loire . . .	600	Durance . .	220
Rhône . .	525	Cher . . .	215
Seine . . .	470	Vienne . .	207
Garonne . .	360	Tarn . . .	207
Saône . .	304	Adour . .	194
Dordogne .	293	Isère . . .	190
Marne . .	268	Creuse . .	166
Doubs . .	250	Lot . . .	166
Allier . .	250	Vilaine . .	124
Charente .	235	Somme . .	110

Geology.—The strata above the chalk occupy many extensive districts in France. One comprises the chief part of the basins of the Adour, Garonne, Lot, Dordogne, Tarn, Ariège, and other rivers in the S.W. part of the country. A second district is what is designated 'the Paris basin,' extending for several miles in every direction round that city. A third district occupies portions of the basins of the Saône, the Rhône, and the Doubs; while other districts are found in the alluvial formation of the delta of the Rhône, and along many of the smaller valleys of France.

The chalk formation skirts the district occupied by the supercretaceous group on the north-east side alone. The Paris basin is surrounded on almost every side by the chalk, which forms a circular belt of very variable breadth, from 24 to 100 miles; and the same formation occupies the coast of the channel from Cape Gris-Nez to the west of the mouth of the Seine, opposite to that of the south-east of England (Kent and Sussex).

The group which comprehends the oolitic and other formations, from the chalk marl to the lias, surrounds the chalk belt of the Paris basin on the west, south, and east sides, and extends in parts to the ocean and to the different mountain frontiers. The new red sandstone and the magnesian limestone occupy only a small portion of France. The granites, slates, and other primitive rocks, occupy several extensive districts: namely, the whole of Bretagne and the adjacent part of Normandy, and the other conterminous provinces in the west; the mountain district of Auvergne, part of the Cévennes, the hills of Vivarais, Forez, and the Charollais, and a large extent of country west of Auvergne; the Alps; the Pyrenees, in which calcareous formations abound, and organic remains are found at a vast height; the Vosges, where they are not occupied by the new red sandstone or magnesian limestone, by which formations the primitive district is nearly surrounded; a considerable insulated district in the southern part of the Cévennes; and a small tract in the northern part of France, between the Sambre and the Meuse. The volcanic region of Auvergne is described under AUVERGNE, GEOLOGY OF.

The mineral riches of France are considerable. Granite, sienite, porphyry, variolites, and serpentine are quarried in some of the departments; lava in others; marble, limestone, and slate, in others; while various parts of France yield lithographic stone, porcelain clay, brick clay, pipe clay, gypsum, chalk, millstones, and sandstone. Of metals, the chief ores are those of iron, manganese, antimony, lead, and copper. Minute traces of gold and silver are met with. Thirty-three of the departments contain excellent coal. Anthracite, asphaltum, bitumen, petroleum, alum, rock-salt, and lime, are also obtained.

The administration of Public Works in France has published a return of the labours of the engineers of mines for 1845, from which it appears, that from 1844 to 1845 the number of coal-pits has increased from 425 to 449, that of the steam-engines employed in extraction from 301 to 391; and the production from 3,782,000 tons to 4,202,000 tons; of which one million was furnished by the basin of the Loire, 946,000 by that of Valenciennes, 300,000 by the Creuzot and Blanzy, 65,000 by Aubin, 106,000 by Commentry, &c. The quantity of iron cast in 1845 was 439,000 tons.

In respect to the climate of France, it is found that in the northern and western departments less rain falls than in the southern and eastern.

Agriculture.—France has always been considered one of the most agricultural countries in Europe, chiefly on account of the numerous publi-

cations relating to this subject; but in most parts of the country, the progress towards a general adoption of improved methods of cultivation is very slow. In most parts of France the farmer still resides in or near the village, and the land which he cultivates is dispersed over a considerable extent of distant uninclosed fields. He loses much time in going and returning, and he has a great way to carry the little manure which he makes. The great division of landed property, which partly arises from the law as to succession to the property of deceased persons, tends to lessen the size of farms. There are in France very few large proprietors of land, who, like the English country gentlemen, spend a great part of their time in the country, and take an interest in agricultural pursuits. There are not many wealthy and speculative farmers; and few expensive instruments can consequently ever be tried, or brought into general use, nor any extensive improvements undertaken.

The northern part of France, on the confines of Belgium, and the part in the immediate neighbourhood of Paris, are the best cultivated. In most other parts, except where maize is cultivated, the old system of two or three crops of corn and a fallow is generally adopted.

A useful division of France, in respect to its agricultural capabilities, is that into four regions, proposed by Arthur Young sixty years ago. In the northernmost region the vine does not thrive so as to make good wine. The next division, towards the south, is that in which wine is made, but maize, or Indian corn, does not thrive. The third division, still farther south, is that in which both maize and wine abound, but where the climate is still too severe for the olive or the white mulberry. The last division consists of the southern provinces, where the olive and the mulberry abound, as well as maize and the vine. In this part the year often yields two harvests of corn, but the soil is not well adapted to permanent pastures, except at a considerable elevation.

The arable land of France is now estimated at 23,000,000 hectares, which (taking the hectare = 2.47 acres nearly) are about equal to 56,810,000 acres English measure. In 1842 there were 14,000,000 hectares under corn culture, yielding 182,000,000 hectolitres (a hectolitre = about 22 gallons, or $2\frac{3}{4}$ bushels) of wheat, oats, rye, meslin, and maize; the wheat was $\frac{2}{5}$, and oats $\frac{1}{4}$.

The corn culture has not increased much during the present century; but the cultivation of the vine, of the artificial grasses, of pulse, and, above all, of potatoes, has much increased. Beet-root is extensively grown for the manufacture of sugar. The esculent roots and table vegetables are common. Flax and hemp are cultivated in various parts of the country, and to a considerable extent; hops, tobacco, and madder, in a small degree; and colza and rape, for oil, are grown in the north. The arable land and pastures are not intermixed as in England, but generally lie wide of each other. The horses and cows are fed chiefly on clover, lucern, saintfoin, and other artifical grasses, of which no greater extent is raised than is absolutely necessary.

The agricultural implements in use in France are few, and not of an improved kind. Each province has its own fashion in making ploughs, most of which are rude, and do their work imperfectly. Instead of harrows they use a board called a *traineau*, on which a man stands, while it is drawn over the land by a horse or an ox; this levels the surface and covers the seed.

The vine is one of the most important objects of cultivation in France. The amount of land occupied by this culture is about 5,000,000 English acres. The average yearly produce is about 924,000,000 English gallons, of which about one-sixth is converted into brandy. The annual produce of the vineyards is estimated at about 28,500,000*l.* sterling, of which $\frac{10}{11}$ths is consumed in France. Of fruits and of timber-trees France has a very fair supply.

Animals.—The domesticated animals of France are, for the most part, similar to those of Great Britain. Horses in France are by no means equal either in number or in excellence to what they might be under a better system of agriculture. A considerable number are imported annually, although the richness of the soil should rather enable the natives to export. The ass, though probably superior to that of Great Britain, is inferior to the ass of Spain or Italy. Mules are bred in many parts, and some of them are exported. Oxen in France are much employed in the labour of the field instead of horses. The sheep are of various breeds, some of which have been so far improved as to furnish a wool equal to that of Saxony. Some goats are bred in the mountainous departments; and the Thibet goat, whose hair is woven into the Cachemire shawls, has been naturalized in the Pyrenees. The swine are of three races. The trade in salt provisions forms an important branch of industry in some of the departments. The rearing of poultry is much attended to.

Of wild animals there are some which are not found in England. The black and brown bear have their haunts in the French Pyrenees; the lynx is found, though very rarely, in the recesses of the higher Alps; and the wolf and the wild boar are common in the larger forests. The chamois and the wild goat are found on the summits of the Alps and Pyrenees. The stag, the roebuck, the hare, and the rabbit, are common. The marmot, the ermine, the hamster, and the squirrel, are plentiful; as are likewise the smaller beasts of prey and vermin, such as the fox, the badger, the hedgehog, the polecat, the weazel, the rat, the mouse, the mole, and the field-mouse.

Of birds the chief songsters and the birds of passage are much the same as in England, with the addition of the hoopoe and one or two others.

The tortoise, the salamander, the scorpion, and a kind of spider closely resembling the tarantula of Italy, are found. The bee and the silk-worm are the most valuable insects; and the Spanish fly is sufficiently numerous to furnish an article of exportation.

The coasts abound in fish of various kinds, the taking of which occupies a number of hands: the oyster, the herring, the mackerel, and especially

the sardine or pilchard, are the chief objects of attention to the fishermen of the coasts of the Channel and the Atlantic: the tunny and the anchovy to the fishermen of the Mediterranean.

Administrative divisions.—The present civil division of France, including Corsica, is into 86 departments, each of which is subdivided into arrondissements, and each arrondissement into communes. [DEPARTMENT.] The following table gives the names of the Provinces, as they existed before 1789, the names of the departments which have been formed out of them, and the chief town of each department. The arrondissements, communes, population, and chief features are given in separate articles, under the respective names of the departments.

Ancient Provinces.	Modern Departments.	Chief Towns.
1. *La Flandre Française.*	1. NORD.	Lille.
2. *L'Artois.*	2. PAS-DE-CALAIS.	Arras.
3. *La Picardie.*	3. SOMME.	Amiens.
4. *La Normandie.*	4. SEINE-INFE'RIEURE.	Rouen.
	5. EURE.	Évreux.
	6. CALVADOS.	Caen.
	7. MANCHE.	St.-Lô.
	8. ORNE.	Alençon.
5. *L'Ile de France.*	9. AISNE.	Laon.
	10. OISE.	Beauvais.
	11. SEINE.	Paris.
	12. SEINE-ET-OISE.	Versailles.
	13. SEINE-ET-MARNE.	Melun.
6. *La Champagne.*	14. MARNE.	Châlons-sur-Marne.
	15. ARDENNES.	Mézières.
	16. AUBE.	Troyes.
	17. HAUTE-MARNE.	Chaumont.
7. *La Lorraine.*	18. MEUSE.	Bar-le-Duc.
	19. MOSELLE.	Metz.
	20. MEURTHE.	Nancy.
	21. VOSGES.	Epinal.
8. *L'Orléannais.*	22. EURE-ET-LOIR.	Chartres.
	23. LOIRET.	Orléans.
	24. LOIR-ET-CHER.	Blois.
9. *La Touraine.*	25. INDRE-ET-LOIRE.	Tours.
10. *Le Berri.*	26. CHER.	Bourges.
	27. INDRE.	Châteauroux.
11. *Le Nivernais.*	28. NIE'VRE.	Nevers.
12. *Le Bourbonnais.*	29. ALLIER.	Moulins.
13. *La Marche.*	30. CREUSE.	Guéret.
14. *Le Limousin.*	31. CORRE'ZE.	Tulle.
	32. HAUTE-VIENNE.	Limoges.
15. *L'Auvergne.*	33. CANTAL.	Aurillac.
	34. PUY-DE-DÔME.	Clermont.
16. *Le Maine.*	35. SARTHE.	Le Mans.
	36. MAYENNE.	Laval.
17. *L'Anjou.*	37. MAINE-ET-LOIRE.	Angers.
18. *La Bretagne.*	38. LOIRE-INFE'RIEURE.	Nantes.
	39. MORBIHAN.	Vannes.
	40. FINISTE'RE.	Quimper.
	41. CÔTES-DU-NORD.	St. Brieuc.
	42. ILLE-ET-VILAINE.	Rennes.
19. *Le Poitou.*	43. VENDE'E.	Bourbon-Vendée.
	44. DEUX-SE'VRES.	Niort.
	45. VIENNE.	Poitiers.
20. *Le Pays D'Aunis.*	46. CHARENTE.	La Rochelle.
21. *La Saintonge.*	47. CHARENTE-INFE'RIEURE.	Angoulême.
22. *L'Alsace.*	48. HAUT-RHIN.	Colmar.
	49. BAS-RHIN.	Strasburg.
23. *La Franche Comté.*	50. HAUTE-SAÔNE.	Vesoul.
	51. DOUBS.	Besançon.
	52. JURA.	Lons-le-Saulnier.
24. *La Bourgogne.*	53. YONNE.	Auxerre.
	54. CÔTE-D'OR.	Dijon.
	55. SAÔNE-ET-LOIRE.	Mâcon.
	56. AIN.	Bourg.
25. *Le Lyonnais.*	57. RHONE.	Lyon.
	58. LOIRE.	Montbrison.
26. *Le Languedoc.*	59. HAUTE-LOIRE.	Le-Puy.
	60. ARDE'CHE.	Privas.
	61. LOZE'RE.	Mende.
	62. GARD.	Nîmes.
	63. HERAULT.	Montpelier.
	64. AUDE.	Carcassonne.
	65. TARN.	Alby.
	66. HAUTE-GARONNE.	Toulouse.
27. *Le Roussillon.*	67. PYRE'NE'ES-ORIENTALES.	Perpignan.
28. *La Comté de Foix.*	68. ARIE'GE.	Foix.
29. *La Guienne et La Gascogne.*	69. AVEYRON.	Rhodez.
	70. LOT.	Cahors.
	71. TARN-ET-GARONNE.	Montauban.
	72. GERS.	Auch.
	73. HAUTES-PYRE'NE'ES.	Tarbes.
	74. LANDES.	Mont-de-Marsan.
	75. LOT-ET-GARONNE.	Agen.
	76. DORDOGNE.	Périgueux.
	77. GIRONDE.	Bordeaux.

30. *Le Béarn.*	78. Basses-Pyrénées.	Pau.
31. *Le Dauphiné.*	79. Hautes-Alpes.	Gap.
	80. Drôme.	Valence.
	81. Isère.	Grenoble.
32. *La Provence*, including *Le Comtât d' Avignon* and *Le Comtât Venaissin.*	82. Bouches-du-Rhone.	Marseille.
	83. Var.	Draguignan.
	84. Basses-Alpes.	Digne.
	85. Vaucluse.	Avignon.
	86. Corse.	Ajaccio.

This division into departments serves as a basis for all the other administrative divisions. France is divided into military districts, which were 19 in number previous to the revolution of 1848; but it is uncertain whether the division will remain unaltered.

The principal fortresses, (besides those recently formed around Paris,) are—along or near the Belgian, Prussian, and Bavarian frontier—Gravelines, Dunkerque, Lille, Douai, Cambrai, Valenciennes, Condé, Maubeuge, Avesnes, Rocroy, Givet et Charlemont, Mézières, Sedan, Thionville, Metz, Bitche, and Weissembourg; along the Rhenish frontier—Haguenau, Strasburg, Schelestadt, and Neuf Brisach; towards the Jura—Béfort or Belfort, Bésançon, and the new Fort de l'Ecluse; towards the Alps and the Sardinian frontier—Grenoble and Briançon; along the Spanish or Pyrenean frontier — Perpignan, Bellegarde, Mont Louis, St. Jean-Pied-de-Port, and Bayonne. The naval dock and building yards are Brest, Toulon, Rochefort, Cherbourg, and L'Orient. Sloops of war are built also at Bayonne, Nantes, and St. Servan.

The judicial and ecclesiastical divisions of France are described under Department.

Government.—Of the government of France it is scarcely now necessary to give any account; monarchical institutions being abolished, and republican institutions scarcely yet established. The general constitution was defined in a charter granted by Louis XVIII. in 1814, remodelled under Louis-Philippe in 1830, and further modified afterwards. The charter consisted of sixty-seven articles, arranged under seven heads; and the general outline of the government so established bore a considerable resemblance to that of Great Britain. In the chamber of deputies there were 459 members, elected by the departments; and there was a chamber of peers, unlimited in number, chosen by the king, and made hereditary or not, according to royal pleasure. But the revolution of 1848 has overturned the whole of this arrangement. The present national assembly consists of 900 members, Algeria being included as part of France. Neither education nor property is necessary to eligibility; there is universal suffrage to all persons of twenty-one years of age; the votes are taken by ballot; the members elected are paid so much per day (25 francs, or 1*l*). The constitution of the country is now (Oct. 1848) being settled by the assembly. It has just been decided that the government shall be republican, that the president shall be elected for a term of years, and that his election shall devolve, not on the assembly, but, by universal suffrage, on the people at large. The present state of things has been provisional for eight months; but it is expected that the president will be elected in November, 1848.

Population; Religion; Education; Crime.—The principal stock from which the French nation derives its origin is the Celtic. The Celts occupied the greater portion of the country at the time of Cæsar's invasion; but there were a few Aquitaines at the south-west corner; a few Ligurians on the Mediterranean coast; a few Greek settlements on the same coast; and some Belgic and Germanic tribes on the east and north-east. All these, with the Romans, gradually amalgamated into one people. At the breaking up of the Roman empire, three of the invading tribes possessed themselves of France: the Visigoths south and west of the Loire, the Burgundians in the south-east, and the Franks in the north and east. Politically, the ascendancy of the Franks extinguished the independence of their co-invaders; but the tribes which succumbed to their yoke remained in the settlements they had acquired, and have influenced more or less the characteristics of their descendants. The languages and dialects still prevalent in different parts of France correspond with their diversity of race and origin.

The population of France has progressed in the following manner :—

1700 . .	19,669,320
1762 . . .	21,769,163
1784 . . .	24,800,000
1801 . . .	27,349,003
1811 . . .	29,092,734
1821 . . .	30,461,875
1831 . . .	32,560,934
1841 . . .	34,230,178

The predominant religion of France is the Roman Catholic; but there is a considerable number of Protestants, especially in Alsace and in Languedoc. According to the statements of M. Balbi, more than fourteen-fifteenths of the population belong to the Catholic church; but this statement is to be received as true only upon the assumption that all are Catholics who do not worship under some dissenting form.

Before the first French Revolution, the country abounded with monastic establishments for both sexes, some of them endowed with vast possessions. The abbeys and convents for men have been, with very few exceptions, abolished; but many of those for women have been retained. The Protestants are partly of the Lutheran, but chiefly of the Reformed church; a few of them are Baptists. There are about 6000 Jews in France.

Before the first Revolution France had twenty-three universities, of which Paris was the most important, and enjoyed great privileges. Under Bonaparte a body was organized with the title of *Université.* Of this body all public teachers are members. The highest officer is the minister of public instruction; he fills up all vacancies in the *académies* and *collèges*, upon the recommendation however of the local authorities, by whom strict

examinations are instituted. He is assisted by a council of ten members, men of the highest rank in the literary world. Twenty-six *académies universitaires* are established in different parts of France; and the whole territory is divided into as many circuits, one to each. Each *académie* consists of a rector or superintendent, and of a council of ten members; the educational arrangements comprise a college and a high school. The preparatory instruction to the academies is furnished in the colleges or high-schools, which are established in almost all the larger towns. The lowest grade of schools comprehends the *écoles primaires*, or elementary schools, in which France was formerly very deficient; but in 1837 a system of communal schools was established, which is calculated to carry education down to the humblest ranks.

With regard to the state of crime, it has been found that offences against the person are proportionably more frequent in France than in England; but that offences against property predominate in England.

Manufactures; Commerce; Communications, &c.—Every branch of industry in France has undergone vast improvement since the peace of 1815. The energies of the nation being turned from war to domestic employments, speedily repaired the evils which France had suffered from so long a struggle.

The woollen manufacture has increased materially: the increased quantity of wool used is partly furnished by the increased number of sheep bred, partly by the importation of foreign wool. The quality of the home-grown wool has been improved by the introduction of foreign breeds, and the Cachemire goat has been naturalized on the slopes of the Pyrenees.

The cotton manufacture has increased since 1812 in a greater proportion than that of wool, and the process of manufacture and the fineness and excellence of the fabrics have undergone great improvements. The north and east of France are the chief seats of this manufacture. Printed calicoes are made at Rouen and Beauvais; but especially at Colmar, Mühlhausen, and other places in the department of Haut Rhin, the printed cottons of which are much approved in the German markets for the vividness of their colours (especially the Turkey red), and their other qualities. The silk manufacture is carried on chiefly in the south. The brilliancy of the French silks has been increased by the substitution of Prussian-blue for indigo as a dye. A part of the raw silk required for these various fabrics is grown in France. Linens, damasks, sail-cloth, and lace, are made to some considerable extent. The working of the metals has much increased, especially iron. The quality and appearance of the steel and wrought-iron goods have much improved; yet the quality of the French iron is inferior, and it maintains its ground against the Russian and Swedish iron only by means of protecting duties. In the manufacture of clocks and watches France is almost equal to Switzerland; and for chronometers and instruments for scientific purposes it is not surpassed by any country. The inventions of the French chemists and the improvement of chemical science have done much in producing with economy and expedition the many chemical agents employed in the various branches of manufacture, and particularly dyeing. The commoner sort of French earthenware has much improved in beauty of design. Fine porcelain is made at Sèvres, Paris, and Limoges. The cut-glass is nearly equal to that of England in beauty of workmanship, and it is perhaps superior in elegance of form.

The total amount received for imports into France in 1846 was 153,914,499 francs.

In the year 1846, among the commodities imported from France into Great Britain were 72,000 qrs. wheat; 2,270,000 pairs of gloves; straw bonnets, 2,220; 29,000 pieces cambric; 100,000 cwts. madder and madder roots; 42,000 cwts. clover seed; 474,000 lbs. raw and waste silk; 319,000 lbs. thrown silk; 411,000 lbs. manufactured silk; 374,000 dressed kid skins; 780,000 lbs. wool; 466,000 gallons wine; 2,220,000 gallons brandy.

The declared value of the British and Irish produce and manufactures exported to France in 1846 was 2,715,963*l.* The chief of these commodities were the following:—Beer and ale, 3000 barrels; brass and copper manufactures, 91,000 cwts; coals, 670,000 tons; cotton manufactures, 137,000*l.*; cotton yarn, 30,000*l.*; hardware, 116,000*l.*; iron and steel, 51,000 tons; linen manufactures 87,000*l.*; linen yarn, 262,000*l.*; machinery, 167,000*l.*; silk manufactures, 172,000*l.*; tin and pewter, 50,000*l.*; wool, 236,000*l*; woollen yarn, 81,000*l.*, woollen and worsted goods, 151,000*l.*

The trade between England and France in 1847 was as follows, the amounts stated being the official values:—

	£.
Exports of British and Irish produce and manufactures to France . .	3,400,576
Exports of Foreign and Colonial goods from Great Britain to France .	970,677
Imports from France to Great Britain	4,792,663
Import duties on ditto	1,667,754

The means of internal communication in France are much inferior to those of Great Britain. The roads are divisible into those maintained by the central government, and designated *Routes Royales*, and those which are kept up at the cost of the several departments to which they belong, and designated *Routes Départementales*. Besides these there are *Chemins Vicinaux*, or bye-roads. The *Routes Royales* extend about 22,000 miles. Posting and the mail service along these roads are under the control of the government. Diligences run on all these roads. The departmental roads are rather greater in length than the royal, but are mostly in bad condition.

The inland water communication is carried on by means of the great rivers and by the canals which have been formed. Many of the rivers have been improved for navigation; and the artificial canals are rather numerous. The names and lengths of the principal canals are as follow:—

	Miles.
Canal of Deule . .	41
„ Somme . .	97

Canal of	St. Quentin .	58
„	Briare . .	34
„	Loing . .	33
„	Orléans . .	45
„	Bourgogne . .	150
„	Ourcq . .	58
„	Nivernois . .	109
„	Ille . . .	53
„	Brest and Nantes	232
„	Charollais . .	73
„	Berri . . .	199
„	Languedoc . .	151
„	Monsieur . .	217
„	La Rochellet .	48
„	Sambre et Oise .	43

The railway system of communication has not made considerable progress in France Lines have been laid out along most of the great travelling routes in the kingdom; and the following portions were open for traffic in October, 1848:—Paris to Rouen, whence two branches lead to Hâvre and Dieppe: Paris to Boulogne and Calais through Amiens, whence a line runs to Brussels through Douay, communicating by branches from this last town with Valenciennes, Lille, Calais, and Dunkirk: Paris to Versailles, two lines, one on each bank of the Seine: Paris to Orleans, and thence to Tours, and through Vierzon to Bourges and Châteauroux: Paris to Corbeil: Paris to St.-Germain: Paris to Sceaux: St.-Etienne to Lyon and Roanne: Marseille to Avignon: Nîmes to Beaucaire: Nîme to Alais: Nîmes to Montpellier and Cette: Montereau and Troyes: Creil and Compiègne: Bordeaux to La Teste; and Strasburg to Bâle.

History.—Gallia was the general term by which this country was designated by the Romans. Little was known of it either to the Greeks or Romans till the time of Julius Cæsar, who found in it the three races of Aquitani, Celts, and Belgæ, with an intermixture of some Germans, Ligurians, and Greeks. The part of Gallia with which the Greeks formed the earliest acquaintance was the Mediterranean coast, on which they established colonies. The earliest and most important of these colonies was Μασσαλία (now Marseille), founded about 600 B.C. Several colonies were founded on the coasts of Gallia, Italy, Spain, and Corsica, by its inhabitants, such as Agatha (Agde), Antipolis (Antibes), Nicæa (Nice), &c.

At the commencement of the second Punic war Hannibal marched through Gaul in his route from Spain into Italy. After the close of the Punic wars the Romans gradually extended their power in Gallia; but not without repeated contests with the Cimbri, the Teutones, and other tribes. Under Augustus, Gallia was divided into four provinces—Narbonensis, Celtica or Lugdunensis, Belgica, and Aquitania. Shortly afterwards the province of Belgica was dismembered by two provinces being formed out of the districts along the Rhenus (Rhine); and at a subsequent period the number of provinces reached, by successive dismemberments of the larger provinces, its maximum, seventeen.

In the decline of the Roman power Gaul was ravaged by the Franks, the Burgundians, and

many other tribes; but the Roman power still sufficed to keep these barbarians from settling in Gallia; it could not however abate the constant pressure on the frontier; and the decaying strength of the empire only protracted but could not avert the final catastrophe. The Franks were a confederacy of German tribes, which preserved their independence while confederated, and each had its king.

On the last day of the year 406 the Rhine was crossed by a host of barbarians who never repassed that frontier stream. They consisted of Vandals, Alans, Suevians, Burgundians, and other nations; and although they were kept in check for a time, they succeeded in establishing themselves in various parts of the country. The Franks assisted the Roman emperors against the invading tribes; and when this assistance failed in being effectual, the whole joined interests against Attila, who brought his Huns against Gallia in 451.

It was not until the reign of Clovis, about A.D. 481, that the Franks assumed a commanding position. He first conquered the Roman portion of Gallia, and then portions belonging to minor tribes; and his sway by degrees extended from the banks of the Lower Rhine to the Loire, the Rhône, and the Ocean, including all except small districts held by the Burgundians, the Visigoths, and the Ostrogoths. On his death, in 511, his newly-found kingdom was divided among his four sons Thierri, Clodomir, Clotaire, and Childebert; but in a few years afterwards, the whole were again united under Clotaire, together with additional provinces taken from the Burgundians and the Ostrogoths.

The Merovingian dynasty, or race of Clovis, ceased in 752, on the death of Childeric III.; and then commenced the Carlovingian dynasty. Pepin reigned from 752 to 768; Charlemagne from 768 to 814; and Louis le Débonnaire from 814 to 840. The kingdom reached a great pitch of splendour under Charlemagne; but under the successors of Louis (Charles le Chauve, Charles le Gros, Charles le Simple) the country became a prey both to the inroads of the Normans and to internal discord.

Hugues Capet, Count of Paris, commenced a new dynasty after the death of Louis V., in 987; and from that time the history of France is less involved. The crown descended with tolerable regularity to the son or other successor of each deceased king, and the divisions and reunions of the parts of the kingdom ceased. The kingly power was indeed feeble; but it gradually acquired strength, and the royal domain (as distinguished from the domains of the great feudal lords) was progressively enlarged by the conquest, forfeiture, inheritance, or acquisition by other means, of the greater fiefs. The dukes of Bourgogne and Normandie were among the most powerful of the French lords; and of the rest the principal were the count of Champagne, the count of Vermandois, the count of Flanders, the count of Anjou, the count of Poitou and duke of Aquitaine, the count of Toulouse; and, though at a somewhat later period, the duke of Bretagne. The six paramount feudatories, who afterwards became exclusively

peers of France, were the dukes of Bourgogne, Normandie, and Aquitaine, the counts of Flanders, Champagne, and Toulouse. The vassals of Hugues, as count of Paris and Orléans, made such approaches to independence, that, at his death, the authority of his successor extended little beyond the walls of Paris and Orléans.

The following are the names and dates of accession of the kings of the direct line of the family of Capet:—

Hugues Capet	987
Robert	996
Henri I.	1031
Philippe I.	1060
Louis VI.	1108
Louis VII.	1137
Philippe Auguste	1181
Louis VIII.	1223
Louis IX.	1226
Philippe le Hardi	1270
Philippe le Bel	1285
Louis X.	1314
Jean I.	1316
Philippe V.	1316
Charles IV.	1322

Under Philippe I., the Norman conquest of England took place. Under Louis VI., both the regal and the feudal systems acquired much consolidation in France. Under Philippe Auguste the crown gained increased power over the feudatories; and Normandie, Maine, Anjou, Touraine, and Berri became united to the royal domain. With various fluctuations, the power of the kings gradually extended under the remaining sovereigns of the Capetian race.

Then succeeded the collateral branch of Valois, which furnished the following kings to France:—

Philippe VI.	1328
Jean II.	1350
Charles V.	1364
Charles VI.	1380
Charles VII.	1422
Louis XI.	1461
Charles VIII.	1483

Under the first three of these kings, France was engaged in war with Edward III. of England, and was also disturbed by internal convulsions. Louis XI. seized the dukedom of Burgundy, and broke down the feudal power of the nobles.

After one king of the branch of Valois-Orléans (Louis XII., A.D. 1498,) came five kings of the branch of Valois-Angoulême:—

François I.	1515
Henri II.	1547
François II.	1559
Charles IX.	1560
Henri III.	1547

François I. brought the kingdom to a flourishing and enlightened position. Under the last two kings of this dynasty, the country was disordered by the conflicts between the Catholics and Protestants, especially the massacre of St. Bartholomew.

Then commenced the dynasty of Valois-Bourbon:—

Henri IV.	1589
Louis XIII.	1610
Louis XIV.	1643
Louis XV.	1715
Louis XVI.	1774

In the reign of Henri IV. the resources of France were so far developed that the country began to assume that station in European politics to which its territorial extent, population, and social improvement entitled it. A fairer prospect seemed to be opening to the rulers of that country. The earlier kings had to struggle with the spirit and the institutions of feudalism; and when, at the close of the direct line of the Capetians, the predominance of the law over the armed violence of feudalism seemed to be gaining consistency and strength, the accession of the house of Valois brought on the struggle between the kings of France and England for the right and possession of the crown. The reviving strength of the crown and the kingdom under Charles VIII., Louis XII., and Francis I., was repressed by the rising power of Spain and the ascendency of the imperial house of Austria, and exhausted by the unsuccessful attempts made to gain possession of Italy. Then came the ascendency of the house of Lorraine, and the wars of religion which desolated France for thirty years. At length however the exhaustion of the Lorraine party, or 'The League,' and the opportune conversion of Henri IV. to the Catholic faith, restored peace. Henri extended the French territories, encouraged religious toleration, and supported his great minister, Sully, in many enlightened plans for national improvement. The reign of Louis XIII., under the ministerial rule of Cardinal Richelieu, was marked by attempts to crush the nobility, to humble the Protestants, and to set bounds to the power of Austria. Louis XIV. distinguished his reign by brilliant military successes, and by the subjection of the nobles, who had eventually weakened themselves and each other by dissensions. The nobility were reduced to be the mere dependants on the court; their titles descended to all their children, and a noble held the pursuit of commerce, and even of the liberal professions, to be a degradation; the country was burdened by the expenses of a court which had such a body of retainers, and the privileges and exemptions from taxation, which the nobility possessed, and other relics of the feudal system, were among the principal causes of the French Revolution. The despotism of Louis XIV., however splendid in appearance, prepared the way for the overthrow of the crown. The reign of Louis XV. effected little else than to hasten the catastrophe which fell on his successor.

State of France before the Revolution.—The population of France, previously to the first revolution, was politically divided into three classes, called *états*, or states—the clergy, the nobility, and the commons, or *tiers état*. The clergy, as a political body, was divided into the old French clergy, and the foreign clergy, that is, those belonging to the provinces which had been united with France since the reign of Henry the Second.

The nobility of France was exceedingly numerous; for not only all the children of a noble belonged to the class of their father, but that class was continually increased by the creation of new nobles. There were about 4000 offices or places

in the country which conferred nobility. The nobility possessed great privileges. The third class of the inhabitants of France comprehended the whole population, except the nobility and clergy, and constituted somewhat more than $\frac{29}{30}$ parts of the whole. The *tiers état* were crushed by the burden of a most injudicious taxation, the weight of which pressed almost exclusively on them. This was rendered still more intolerable by the oppression of the landowners or their agents, and by the grossest abuses of the manorial jurisdiction. A consequence of all this was the greatest misery among the people, and a deeply-rooted hatred towards the higher classes, which manifested itself in the terrible acts of revenge and bloodshed which accompanied the Revolution in France.

The revenue was derived from direct and indirect taxation. The direct taxation consisted—1st, of a land-tax called *taille*, levied only on the lands belonging to the non-privileged classes; 2nd, the capitation, to which all classes were equally subject; 3rd, a property tax, principally assessed on lands. These taxes were in many respects very oppressive. But the indirect taxes were still more so. They consisted—1st, of customs levied not only on goods imported from abroad, but on those which passed from one part of France to another; 2nd, of the monopoly of snuff and tobacco; and 3rd, the monopoly of salt. This last was a complete fiscal tyranny, both in its nature and in its mode of collection. The oppression caused by this system of taxation was increased by the custom of farming out the indirect taxes, and by injudicious corn-laws. (Young's *Travels in France*, 'Police of Corn,' i. 488, 2nd ed.)

The revenue extorted from the people by this system of taxation was squandered in the most profligate manner. Louis XIV. and Louis XV. shamelessly paid their courtezans and favourites out of the public purse. Louis XVI., on whom the storms of popular indignation subsequently fell, was far less obnoxious to these charges than his predecessors.

The royal power, which had long been limited by the feudal institutions, gradually became absolute. The meeting of the states-general (*états généraux*) had been discontinued since 1614. Some provinces, as Artois, Bretagne, Languedoc, &c., had their provincial states, which were composed of the deputies of the nobility, clergy, and *tiers états;* all their powers however consisted in making the assessment of the taxes in order to raise the quota of the general revenue which was required of these provinces. The municipal institutions, which were flourishing in France during the middle ages, were almost entirely abolished, and the offices of towns were generally either hereditary or acquired by purchase. The offices of state, and the courts of justice, were all so regulated as to give the people as little voice as possible in the national affairs. Hence arose a smothered indignation, which showed itself in terrible colours before the close of 18th century.

The chief events in the history of France are given under the names of the respective kings. The progress of the first French Revolution is detailed under the names of Bonaparte, Louis XVI., and the chief actors in it. It will suffice to give here merely a short chronology of events:—

1787. The Meeting of the Notables, a number of persons from different parts of the kingdom, chiefly selected by the king. The Notables were dissolved the same year.

1789. The States General, the ancient assembly of the kingdom, consisting of the deputies of the nobles, clergy, and of the Tiers État or commons, assembled. The Tiers État, with such deputies of the clergy as chose to join them (none of those of the nobility accepted the invitation), voted themselves the supreme legislative body, under the title of the National Assembly In this year the division of the kingdom into departments was introduced.

1790. Hereditary nobility and titles of nobility were abolished.

1791. A new constitution was promulgated by the Assembly:—France was declared a limited monarchy.

1791. The Legislative or National Assembly assembled according to the new constitution.

1792. The royal authority was suspended by the Legislative Assembly. After the 10th of August the nation was invited to elect a National Convention, and determine on the form of the government. The Convention met in September, and proclaimed a republic.

1793. Louis XVI. was executed: the nominal reign of his son Louis XVII. (born 1785) commenced.

1793. The constitution of the republic was completed; but it was determined that the Convention should continue in power till the end of the war.

1795. A new constitution was substituted for that of 1793, which was found to be impracticable. The executive power was confided to a body of five, called the Directory. Two legislative bodies, the Council of Ancients and the Council of Five Hundred, were constituted. The nominal king, Louis XVII., died.

1799. The constitution was remodelled: the Directory was overthrown: Consuls for a term of years were appointed; Bonaparte, Sièyes, and Ducos, provisionally: then Bonaparte, Cambacérès, and Le Brun.

1802. Consuls for life were appointed—Bonaparte, Cambacères, and Le Brun.

1804. Napoleon assumed the sovereign power as Emperor.

During these changes the boundaries of France were continually extending. Between 1789 and the fall of Napoleon, France obtained sovereign power over Avignon, Venaissin, Montbéliard, Nice, Mühlhausen, Germany left of the Rhine, Austrian Netherlands, part of Switzerland, Piedmont and Liguria, Ionian Islands, portions of Germany east of the Rhine, Holland, Parma, Tuscany, and parts of the Papal States; but most of these possessions were restored to their former owners on the downfall of Napoleon.

1814. Louis XVIII., brother of Louis XVI., born A.D. 1755. The Charter was granted in 1814 by this king, after the exile of Napoleon to Elba.

KBA Accession No: 723 Date; 4-2-81

1824. Charles X., brother of Louis XVIII., born A.D. 1757. The second revolution broke out A.D. 1830.

Collateral Branch of Orleans.

1830. Louis Philippe, previously duke of Orléans, descended from a younger brother of Louis XIV., born A.D. 1773.

When Charles X., by a course of proceeding which savoured too much of the old despotism, gave occasion for the outbreak which resulted in his expulsion in July 1830, Louis Philippe, duke of Orléans, accepted the throne on constitutional principles. The hereditary peerage was abolished, and various reforms were made, tending to assimilate the government more nearly to that of England. By degrees the confidence of the people in the new king became somewhat shaken, and many severe laws were passed. In 1835 the Duc de Broglie, then prime minister, proposed a series of stringent laws against the liberty of the press, and against the independence of trial by jury; and he succeeded in carrying them in spite of all opposition. Prosecutions against political offenders became frequent; and much hostility and heartburning arose. The king however being a man of great ability, and having the tact to play off the leading statesmen against each other, succeeded in consolidating his power, though not without repeated incipient insurrections, and many attempts on his life. The war in Algeria, the disagreements with England respecting Syria, Tahiti, and the right of search; the bringing back of the remains of Napoleon from St. Helena; the death of the Duke of Orléans, and the appointment of a regency; the various marriages by which Louis Philippe strengthened his family connexions; the fortifying of Paris—these formed some of the chief events of the reign. In the latter part of 1846 occurred the events connected with the marriages of the Queen of Spain and her sister: these circumstances led to some degree of estrangement between England and France, which lasted till the downfall of the king.

Republic of 1848.

During 1847 demands for constitutional reforms in France became loud and frequent; but, as public meetings for political discussion were prohibited by law, such discussions were transferred to public banquets. These banquets became more numerous as the year advanced; and it became at length customary to omit drinking the king's health. In December, these banquets were alluded to in the royal speech, in a way that gave rise to much acrimonious discussion in the Chamber of Deputies. In the same month the king's sister, Madame Adelaide, died; and in the same month, also, the war in Algeria was closed, by the surrender of Abd-el-Kadir to the Duc d'Aumale. Then came the eventful year 1848, which we must treat in successive months.

January. The hostility of the government to the reform banquets was the great political question agitated, both in and out of the Chamber of Deputies.

February. On Feb. 10, M. Duchâtel declared that the government would not only grant no reform, but would put down the reform banquets. This decided the fate of the king; a banquet was agreed on for the 22nd, in spite of the ordonnance; and although this was given up, articles of impeachment against M. Guizot were brought into the Chamber of Deputies by M. Odillon Barrot, on the morning of that day. The populace had been too much roused to subside again into order; the conflicts in Paris of the 22nd, 23rd, 24th, and 25th took place, and the government was vanquished. The king, the royal family, and M. Guizot, took flight; the proposal of a regency under the Duchess of Orleans was rejected; and a provisional government was established.

March. During this month, the provisional government endeavoured to restore order. M. Lamartine gained much respect for the energy with which he conducted his office of foreign secretary; but socialist and communist theories were promulgated by some of the members of the government, which led to subsequent disasters.

April. Financial affairs assumed by this time a desperate position; failures occurred all over France; and the operatives, urged on by theorists and by the numerous clubs which had now become established, clamoured for state support. Many conflicts arose out of this question of the state-support of workmen. The election of 900 representatives to form a National Assembly took place.

May. On the 4th of this month the National Assembly met; and soon afterwards an *ad interim* executive government was chosen, composed of Lamartine, Ledru Rollin, Garnier Pagès, Arago, and Marie. This executive government chose a ministry, which was embarrassed by many violent proceedings on the part of the working classes. General Cavaignac was made minister at war.

June. M. Cremieux, minister of justice, resigned. A grant of 3,000,000 francs was made on the 15th to the national workshops; but as the government felt the necessity of putting an end to this system, the populace broke out into the revolt which led to the carnage of the 25th and three following days. General Cavaignac was placed in absolute command, and suppressed the insurrection.

July. Cavaignac kept Paris in a state of siege; and his ministers made arrangements for abolishing the national workshops, and for supplying the finances required by the state. Measures were taken to check the power both of the press and of the clubs. Many of the former ministers felt it necessary to explain their conduct in respect to the recent outbreak.

August. A committee reported that MM. Louis Blanc, Ledru Rollin, and Caussidière, were seriously implicated in the insurrection of the previous month; Louis Blanc and Caussidière afterwards escaped to England, and the proceedings against Ledru Rollin were given up. General Cavaignac adopted stringent proceedings against the press.

September. During this month the National

Assembly entered on the discussion of the constitution, by which republican France is to be governed. A majority of 530 to 289 decided that there shall only be one legislative chamber. Many clauses of the constitution were agreed to.

October. The further discussion of the constitution was proceeded with; the duties and the mode of election of the president and the council of state were agreed to; the salary of the president was fixed; and many clauses were agreed to. Such has become the complex state of public opinion between republicans of various shades, Bonapartists, Bourbonists, and Orléanists, that the election of president in November, 1848, is looked forward to with much anxiety.

Language and Literature. First period; anterior to Francis I.—The dominion established in Gallia by the Romans ultimately destroyed the ancient languages of the country. No monuments of the poetry of the Celts of Gallia have reached us, although we may conjecture that they had one similar to the Irish and Gaels. The invasion and settlement of Germanic nations in Gallia produced a corruption of the Latin by the admixture of foreign idioms. This Latin became still more corrupted by the admixture of a foreign race, and degenerated into a peculiar idiom called the *Romanzo*, or *Lingua Romana Rustica*. This idiom became not only the language of France, but of many other parts of southern Europe. One branch of the Romanzo was the *Langue d'Oc*, or *Provençal*, which was cultivated by the Troubadours. The languague of Northern France was called *Langue d'Oui*; and in it were written Robert Wace's *Brut de Angleterre*, the *Roman de Rou*, and other Norman tales and romances. The poets who wrote in the Langue d'Oui were called *Trouvères*, and like their namesakes of Provence, the Troubadours, reckoned among their body several persons of high rank. Another kind of poetry which belongs to this period is the Fabliaux, or tales, which are partly of oriental origin, and were imported by the Crusaders into Europe. They are generally written in verse, and sometimes alternately in verse and prose.

The persecution of the Albigenses, whose tenets were embraced by many of the Troubadours, led to the gradual decline of the Provençal language; while the establishment at Paris of the seat of government for France, and of a university, rendered the northern dialect, or the *Langue d'Oui*, the predominant language of all France.

The 15th century gave birth in France to a kind of allegorical and satirical poetry, of which the most remarkable specimens are the *Roman de Renart* and the *Roman de la Rose*. The former is the well-known story of 'Reinard the Fox,' and is the same popular tale as the German *Reinecke Fuchs*. The *Roman de la Rose* is perhaps the most celebrated French production of the middle ages. It is a kind of didactic allegorical poem, which professes to teach the art of love, and embraces the most varied subjects. It is a very extraordinary mixture of divinity and profane science. Among the poets of the 14th and 15th centuries are the celebrated annalist Froissart and Charles duke of Orleans (died in 1466), whose poems excel those of his contemporaries in tenderness and depth of feeling. Other poets of those centuries were Clotilde de Surville, Olivier Basselin, Chartier, Villon, Bordignée, Michault, and Martial d'Auvergne.

The French drama arose out of the custom of pilgrims singing rude songs, and making recitals of the life and death of Christ, and other sacred subjects, at the various places of pious resort. In 1402 Charles VI. authorised these exhibitions by letters patent; stages soon arose in every province; and the *mystères* were so much relished, that on holidays the hour of vespers was hastened, that the people might have more ample time to be present at the play. The brethren, to vary the attractions of the performance, added a sort of farcical interludes or afterpieces of a merely worldly character, the enacting of which however, careful of their own histrionic dignity, they delegated to a junior society called that of the *Enfans sans Soucis*. These latter pieces, in allusion to their burlesque and buffoon character, were denominated *sottises* or *sotes*.

Among the French, as elsewhere, the Passion was the primary, the most constant, and most solemn subject of these representations, the parts of Christ on the cross, Judas hanging himself, &c., being all played by real persons, sometimes at the actual peril of their lives. Another grand play or mystery was the Acts of the Apostles, which was encouraged both by king and church. The priests so managed some of these mysteries as to retard for a time the spread of the Reformation.

After the *mystères* and the *soties*, and during their continuance, came the *moralités* and the *farces*, of which the clerks of the Basoche were the inventors. These clerks were the young assistants of the procureurs, or solicitors. The monks having the exclusive privilege of acting mysteries, the clerks were driven to the invention of the *moralities*, which were purely allegorical pieces personifying the vices and virtues. The farces and the soties, on the other hand, took a satirical turn, the success of which soon carried the authors to licentious extremes. The society of *Enfans sans Soucis* produced many *soties*, or farces, from time to time, and Louis XII. is said to have favoured all these varieties of stage representation. But the freedom of opinion which these dramatists allowed themselves became distasteful to the court as the regal power increased; and hence was occasioned the decline of these various kinds of drama, to be succeeded by imitations of the classical drama, which were permitted on account of being politically innocuous.

Among the earliest prose writings in France, are 'Mémoires,' a kind of literature peculiar to the French, and the commencement of which dates from the 13th century. These first historical productions in the French language were written by men engaged in active life, who related what they had themselves experienced and observed; and they therefore felt the necessity of abandoning the language of poetry to express themselves in that of common life. The characteristics of these old memoirs are simplicity united with piety and a ceremonious courtesy. The writers of this class

whose names are best known to us, are Geoffroy de Ville Hardonin, Jean de Joinville, Christine de Pisau, Olivier de la Marche, Philippe de Comines, and Froissart.

Period 2nd; from Francis I. to Louis XIV. (1515—1643.)—The French literature of the middle ages, although rude, has the merit of being truly national; it bears the stamp of the French character, and gives an image of the civilization of those times. Under Francis I. the study of the Greek and Roman authors began to spread in France; and the French writers, dazzled with the hitherto unknown beauties of the classical writers, despised the works of their forefathers and attached themselves to the imitation of the ancients. The national recollections, as well as the ideas introduced by Christianity, were replaced by the history and mythology of ancient Rome and Greece; and thus arose the so-called modern Classical school.

The poets of this period included among their number Francis I, Marguerite de Valois, Mary Queen of Scots (who was educated in France), and Henri Quatre; but the poets whose names are better known as such, were Clement Marot, Etienne Dolet, Louisa Labé, Ronsard, Jodelle, Baif, Dubellay, Du Bartas, Regnier, Des Roches, Bertaut, Desportes, Racan, Gombauld, Gadolin, and Malherbe. Classicisms, and flattery of the court, were common among most of the writers.

The predilections of Francis I. brought the romance of chivalry again into fashion; but it could not long maintain its ground against the fast-spreading taste for classical literature and its imitations. The romance of chivalry however did not disappear altogether, but it lost its primitive character and degenerated into politico-historical romances and tales of love intrigues. To this period may be referred the epistolary compositions of Balzac and Voiture, and the satirical romance of Rabelais.

From Jodelle down to Corneille, French dramatic art made little progress; but dramatic productions, in the same line of classic imitation, abounded, especially in tragedy, the heroes of which were constantly taken from Greek or Roman history, or at most from that of the Turks, who were first introduced upon the stage by Gabriel Bonnin. The players of the early mysteries found that the taste of their audiences underwent some change; and the mysteries themselves gradually died out. Tragedies of classic pomp, and prose comedies of intrigue, usurped their place. At length, in 1660, two permanent theatres were erected at Paris, one of which was occupied by a company which took the title of 'Troupe de la Comédie Française.' From the commencement of the 16th century till the appearance of Corneille, scarcely anything was brought forward but either tragedy or that very harmless description of farce which, it was thought, might without much danger be conceded to the popular taste. Alexandre Hardy was the most voluminous dramatist of the period: he wrote more than 800 dramas.

Among the historical writers of this period, Thuanus, although he wrote in Latin, occupies the first place, and still maintains his reputation. Theodore Agrippa D'Aubigné wrote a history of his own times. Blaise de Monluc, Michel de Castelnau, Brantome, La Popelinière, Beza, Sully, Serran, and Bodin, were also historical writers of this period. The moralists included Montaigne, Etienne de la Boetie, and Pierre Charron; Ramus, Vieta, Belon, Olivier de Serres, and others, wrote on various branches of science; while there were many erudite scholars in classical literature.

Period 3rd; Reign of Louis XIV. (1643—1715.)—We now come to the age of Louis XIV., which the French call the golden age of their literature. The language became a universal idiom among the higher ranks of society all over Europe, and the French prose acquired that degree of ease, clearness, and precision, which justly entitle it to be considered in those respects as the first language in Europe. The French Academy greatly contributed to purify and refine the language, but at the same time put upon it heavy trammels by injudiously proscribing every innovation.

Among the poets of the period were the fabulist La Fontaine, the satirist Boileau, and the pastoral writers, Fontenelle and Madame Deshoulières. The only lyric poet worth mentioning was J. B. Rousseau. In this reign the romance of chivalry changed entirely into a sort of historical novel, of which Fenelon, Mademoiselle de Scudéri, and Calprenède, were the chief writers. Other novels and fairy tales introduce to us the names of Bussy de Rabutin, Perrault, Galland, Hamilton, Scarron, and Le Sage.

The art of elegant letter-writing, which was introduced by Balzac and Voiture, became in France an almost indispensable accomplishment of well educated persons; and many authors, as well as other eminent persons of this period, have left admirable specimens of the epistolary style. Madame de Maintenon, Madame de Sevigné, the Countess de Staal, and Ninon de l'Enclos, were the chief of such writers in this period.

It was under the rule of Cardinal Richelieu that Corneille commenced writing plays, during the period now under notice. To enter the academy, he must please the court; and to please the court, he must defer to the literary dictation of the academy. Now, in dramatic composition, the academy not merely recommended adherence to the so-called rules of Aristotle, but prescribed their observance with the greatest rigidity. Corneille produced six comedies and one tragedy after the antique models, before he ventured on any bolder attempt; but as the Spanish dramatists adopted a much more free style, and were much admired in France, he yearned to imitate them. His subsequent productions exhibit this struggle between the styles, one of which he preferred, and one which was forced on him by circumstances. The rise of the French comedy of character, of which Molière is the great representative, is yet more clearly deducible from the Spanish source than that of their classic tragedy. The marked separation between tragedy and comedy was a fundamental article of the academic code. But Molière was born for the comic only, and could

therefore indulge his dramatic tastes and propensities with comparatively little restraint. In his first species, written for a strolling company, he imitated the lively trickery and buffoonery of the Italian farces, a species of composition for which, throughout his career, he showed a strong inclination; in his next style he imitated the Spanish comedy of intrigue; but the style which has so firmly established his fame is the comedy of character, to which he was led by Corneille's adaptations from the Spanish. Racine fell more easily than Corneille into the courtly tone; and he became the favourite tragic poet of the court of Louis XIV. He seemed born to carry to the highest possible perfection what may be called the Frenchification of Greek tragedy. He managed with consummate art and most felicitous ease to flatter at once the dramatic taste and the moral temperament of the court. The very anomaly which his works presented, in giving to antique heroes the tone and the language of the French gallantry of his time, thus became one of their highest recommendations. The other tragic writers of this reign occupied a far lower position than Corneille and Racine. The chief among them were D'Aubignac, Pradon, Lafosse, Crébillon, and Longepierre.

Among the prose writers of this long reign were the philosophers La Bruyère and Cureau de la Chambre; the satirist Rochefoucauld; the theologians Bossuet, Bourdaloue, Massillon, Saurin, and Pascal; the historians Mezeray, Rollin, Basnage, Fleury, De Retz, Ducange, and St. Simon; and the metaphysicians Descartes, Malebranche, Gassendi, and Bayle. The Academy of Sciences, founded by Colbert in 1666, greatly contributed to the progress of mathematics and natural philosophy in France by encouraging the labours of such men as Pascal, Fermat, Descartes, D'Hôpital, Ozanam, Vauban, and Tournefort.

Period 4th; Louis XV. to the Revolution (1715—1789).—The 18th century in France is characterised by hostility to religion in the philosophic writers, intolerance and superstition in the clergy and people, weakness in the government and oppression of the people, and a general absence of the higher considerations of morality and virtue. There were honourable exceptions, but this description is on the whole applicable, particularly to the higher ranks. The literature of that period is a faithful mirror of the prevalent tendency of the age.

The principal writer of the 18th century, who may be considered as the representative and the personification of the age, is undoubtedly Voltaire. Next to him was Rousseau in respect to the influence exerted over their readers. The philosophical works of those two men had a deep effect on the French mind generally. Condillac, Diderot, D'Alembert, Helvetius, and Holbach, with the 'Encyclopédie' for their organ, contributed to the diffusion of sceptical opinions. Bonnet and Vernet were among the few defenders of religion.

The historical works of Voltaire, who, though careless in the verification of facts, displayed an unusual degree of critical acuteness, and the productions of Montesquieu, had a marked influence on the study of history. The philosophy of history is indeed a creation of the 18th century. Among the most distinguished of the historians were Mably, De Brosses, Goguet, Barthelemy, Raynal, Velly, Villaret, and Crevier. The knowledge of antiquity was advanced in various ways by D'Anville, Caylus, and Montfaucon.

The 18th century was still less poetical than the age of Louis XIV. The model was Voltaire, and particularly his poetical or rather versified tales. The other poets were Parny, Gresset, Moncrief, Gilbert, Madame du Boccage, Bouflers, Bernard, Leonard, Berquin, Le Franc de Pompignan, Louis Racine, Dorat, Aubert, Colardeau, and Piron. The novels and tales were of a somewhat higher order than the poems; they included the works of Marmontel, Florian, Bernardin de St. Pierre, and J. de Crebillon. Among the writers on polite literature were La Harpe, Batteux, André, and Dubois.

Tragedy occupied much of the attention of Voltaire. The same independence of genius and spirit which made him rebel against other conventionalisms of graver import, prompted him to break through some of the more irksome parts of the restrictions imposed by the established dramatic system. He insisted on treating subjects with more historical truth, and raised once more to the dignity of the tragic stage the chivalrous and Christian characters of modern Europe. But Voltaire seems to have come too late, even with his moderate attempts at reformation of the dramatic system. The prejudice which gave such disproportionate importance to the observance of external rules and proprieties was already immoveably established; nor was it until after the great political change which took place towards the close of the last century that any considerable effort was again made to break through the academic limitations. There was scarcely any other eminent writer of French tragedy till the time of the revolution, when Chénier, Ducis, Arnault, Legouvé, Raynouard, and one or two others of merit appeared.

After Molière's death, a considerable time elapsed before the appearance of Regnard, to whom the second place among the French comic writers has usually been assigned. He divided his labours between the Italian theatre, which still flourished under Gherardi, and for which he sketched the French scenes, and the composition of regular comedy in verse. One of his contemporaries, the actor Legrand, was one of the first comic poets of his nation who acquired celebrity in versified afterpieces, a kind in which the French have since produced many elegant trifles. The same century produced a number of comic writers in France of the second and third rank, but no genius capable of advancing that department of the dramatic art a step farther, and thus the belief in the unapproachable excellence of Molière became yet more firmly fixed. The chief names that appear after Molière are Dancourt, Destouches, Marivaux, Piron, Gresset, and Beaumarchais.

The mathematical and physical sciences made great progress in France during the 18th century.

It is sufficient to mention the names of D'Alembert, Lagrange, Monge, La Lande, Lacaille, Maupertuis, Clairaut, Camus, Lemonnier, Celsius, Condamine, Godin, and Bouguer, to show the richness of this department; and the natural sciences were ably represented by Buffon, Bonnet, Réaumur, Brisson, Vicq d'Azyr, Jussieu, Deluc, and Saussure.

Fifth period: From 1789 *to the present time.*—The violent changes which the Revolution produced in the social state of France had a corresponding effect on the national character and literature, which, in France more than in any other country, may be regarded as the true picture of the public mind. The period of the Revolution was not favourable to literature, for at such a time nothing but journals and pamphlets could succeed; but it produced a rapid development of eloquence. The Revolution also broke the trammels imposed by the French Academy on the language, which became enriched by a great quantity of new words generally formed from Greek and Latin elements. The establishment of the Polytechnique School, and of the French Institute was favourable to intellectual development. During the time of Bonaparte, science flourished more than literature; and after the Restoration of the Bourbons, political pamphlets excited for a time the chief attention; but during the last 30 years almost every kind of literature has been encouraged in France.

Lebrun was one of the earliest poets of this period; but far more popular have been Lamartine and Victor Hugo: the 'Meditations Poetiques' of Lamartine, and the Lyrics, the Odes, and the Ballads of Victor Hugo, have had great celebrity. The most popular poet of France is undoubtedly Béranger. His witty and truly national songs are in the mouth of every Frenchman, from the highest to the lowest. They have attained an historical importance, having been one of the most powerful means of counteracting the retrograde policy of the Bourbons, whose government constantly prosecuted him for ridiculing, in a manner which they could never forgive, their anti-national measures. Casimir Delavigne has acquired his reputation chiefly by his dramatic productions; his poems are characterised by exact versification, beautiful imagery, and noble thoughts; but in true poetic inspiration he is inferior to Lamartine and Victor Hugo. Viennet, Millevoye, Legouvée, Barthelemy, Mery, Delille, Esmenard, Chenedolle, Daru, Leroux, Berihoux, Musson, Lormian, Maison, and Lessert, and Lucien Bonaparte, are among the poetical writers of this period.

In the overthrow of the *ancien régime* in politics fell the main support of the old dramatic code. No sooner were the danger and the fear of anarchy removed by the firm administration of the Consulate, than the new literary and dramatic ideas began to develop themselves, and, in consequence, a violent war to be waged between the *classicistes* of the old school and the *romanticistes* of the new. Lemercier, in his 'Agamemnon' and 'Pinto,' adopted the historical drama, in contrast to the cold classical tragedies of earlier times. But the despotism of Napoleon while emperor, and the censorship under him and the Bourbons who succeeded him, crushed the advancing spirit of the drama; and it was not till the accession of Louis Philippe in 1830 that the shackles were removed. Since that year the higher departments of the French drama have been in full activity. Among the advocates of the Shaksperian drama, Victor Hugo has hitherto shown himself the foremost, the boldest, and the ablest. In tragedy in the more limited sense, though still of the romantic school, Alexandre Dumas and Alfred de Vigny are the most distinguished. It is the higher comedy that seems at present to be the least flourishing.

The serious or ideal French opera dates from the time of Louis XIV. Cardinal Mazarin, himself an Italian, had introduced into France the taste for the Italian opera. Molière was employed to write gay operas, and Quinault grave ones, for the music of Lulli. The *operette*, or comic opera, has been much more successfully cultivated by modern French writers, owing, in a great degree, to the substitution, in this kind, of ordinary dialogue in lieu of recitative, so unfavourable to dramatic animation. The *vaudeville* is but a variety of the comic opera; its essential distinction being, that it dispenses with musical composition, as the songs are set to well-known popular airs.

Among the prose writers Châteaubriand (who died in 1848) has been one of the most popular, both in France and abroad. His subjects are varied, and his style has many beauties. Madame de Staël has been scarcely less popular than Châteaubriand.

France has produced many distinguished writers on metaphysical and moral philosophy during this period. Of the sensuous school of philosophy have appeared Cabanis, Destutt de Tracy, Garat, Condorcet, Volney, and Broussai; of the Catholic and Absolutist school have appeared De Maistre, Lamennais, Bonald, Lacordaire, and Montalembert; the Eclectic school, or school of rational spiritualism, has been represented by De Gerando, Laromiguière, Maine de Biran, Keratry, Massias, Bonstetten, and Droz. Royer Collard and Joufroy introduced the Scotch philosophy into France, and translated the works of Dugald Stewart and Reid. The most popular metaphysical writer of France is Victor Cousin, the translator of Plato. Benjamin Constant and Lerminier are two other distinguished names. Many writers have appeared on various socialist and communist principles, among whom may be mentioned Fourier, Auguste Comte, Louis Blanc, Victor Considérant, editor of the 'Democratie Pacifique,' and Prudhon.

The French historians of this period may be divided into three schools.—1. The systematical, or national school, the present head of which is Guizot, and which seeks from a given mass to deduce certain consequences and principles. 2. The descriptive, or narrative, to which belong Barante, the two Thierrys, and Capefigue; the object of this school is to describe events, and delineate characters and manners with all possible fidelity without indulging in any reflections. 3. The fatalistic school, the chief writers of which are Mignet and Thiers. This school occupies itself

only with political history: it narrates the principal events, and represents the good or evil actions of individuals as necessary consequences of them. The other chief historical writers are Sismondi, Villemain, Montgaillard, Michelet, Depping, Audin, St. Aulaire, Daru, Roujoulx, Dulaure, Lacretelle, Ferrand, Michaud, Buignot, Ancillon, Dumas, &c. The writers on the history of the Revolution and the subsequent wars, and of personal and historical 'Memoirs,' have been so exceedingly numerous that we cannot even mention their names.

Amongst the other writers of this period we may mention Madame de Genlis; Jouy, who is a masterly painter of contemporary manners; Nodier, author of many novels and works on literary criticism; Jules Janin, Eugene Sue, and Madame Dudevant (George Sand), whose novels and tales, though possessing many questionable qualities, are extensively read in France. Indeed, novels are exceedingly abundant, but most of them seem to delight in scenes of horror and profligacy.

The mathematical and physical sciences have been cultivated in France during this period with great success; and a mere catalogue of the works would not only carry us far beyond our limits, but would be foreign to the purpose of this sketch, which is to exhibit the literary character of the age.

FRANCE, ISLE OF. [MAURITIUS.]

FRANCESCA, PIE'RO DELLA, called also Piero Borghese, from his native place, Borgo San Sepolcro, where he was born about 1408. His chief excellence was in perspective, which he was the first to fully develop in practice; in other respects his works are in the prevailing antique style of the period. He died about 1496.

FRANCHE-COMTE', the country of the ancient Sequani, and one of the old provinces of France, now forms the departments of JURA, DOUBS, and HAUTE-SAÔNE. Besançon, the ancient Vesontio, was its capital. It belonged to the dukes of Bourgogne till the death of Charles the Rash, when it fell to Austria. Louis XIV. wrested the province from Austria in 1668 and 1674; and it was finally ceded to France at the treaty of Nimeguen in 1678.

FRANCHISE. A franchise or liberty is a branch of the king's prerogative which is in the hands of a subject. Franchises are either derived from the king's grant, or held by prescription, which presupposes a grant. A few instances may be mentioned: a county palatine is a franchise, and so are privileges given to corporate bodies, forests, chases, the right to wrack, estrays, &c. Franchises may be forfeited by the parties who enjoy them, if they misuse their privilege or neglect to perform the requisite duties in respect of them; and, if the owners are disturbed in the proper exercise of their franchise, they may have remedy in a special action on the case; or, where the franchise is to levy a toll, they may distrain for the amount alleged to be due. (Blackstone, *Com.* iii. 236.)

FRANCIA, FRANCESCO, the name by which *Francesco Raibolini* is known, and which he wrote upon his works, after the name of his master the goldsmith. Francia is one of the most celebrated of the Italian painters, an admirable colourist, and the most perfect in his style, the *antico-moderno*, or that transition style between the comparatively meagre works of the most distinguished early masters and the fully developed form and character of the works of Raphael and his great contemporaries. He was born at Bologna about 1450, and he died there after 1522. In the National Gallery are two admirable specimens of his style, purchased at a cost of 3500*l*.

Giacomo Francia, the son and pupil of Francesco, painted in his father's style: he died in 1557.

FRANCIA, DOCTOR JOSE' GASPAR RODRIGUEZ, the late Dictator of Paraguay, is said to have been born near Assuncion, the capital of Paraguay, in 1757 or 1758. His father was a European, his mother a Creole. José was their eldest son. When he came to the proper age, young Francia was sent to the University of Cordova, in the neighbouring province of Tucuman, to be educated for the church; but he ultimately determined to make the law his profession.

Establishing himself in the town of Assuncion, Francia spent there some thirty years of his life as an advocate or barrister. 'He never,' we are told, 'would defend an unjust cause, while he was ever ready to take the part of the poor and the weak against the rich and the strong.'

The revolution which brought about the independence of the Spanish possessions in South America began in Buenos Ayres in 1810, when Francia was fifty-two or fifty-three years old. Paraguay did not join the other La Plata provinces, but after a time declared its independence, and set up a junta, with Don Fulgencio Yegros as president, and Francia as secretary. Yegros and the others however could not get on with him—or he with them—and he soon resigned his post, retiring to a country house in the neighbourhood of Assuncion. Everything now went from bad to worse; until a new congress which assembled in 1813 placed Francia and Yegros at the head of the republic under the name of joint consuls. From this moment the state of public affairs began to improve, and the country was protected from foreign invasion by Francia's non-intercourse system. The peculiar character which had been impressed by the Jesuits upon society in that country probably contributed to its more strict enforcement. Ingress or egress became nearly impossible for any purpose. Francia's joint consulship had been converted in 1814, by a third congress, into a dictatorship for three years, and then in 1817 into a dictatorship for life. Yegros, in 1819, involved himself in destruction by engaging in a conspiracy for the assassination of his former colleague, the detection and defeat of which consolidated and greatly strengthened Francia's power. This conspiracy led to the reign of terror, as it has been called, during which about forty persons were put to death.

Francia died on the 20th of September, 1840, and was succeeded by a Directory of three persons.

FRANCIS I., of France, was the son of the

Count of Angoulême, grandson of that Louis I., duke of Orléans, who was assassinated by John duke of Burgundy, and through him was a descendant from Charles the Wise. His mother was Louisa of Savoy, daughter of Louis XI. On the death of the Count of Angoulême, Francis was taken into the charge of the king, Louis XII., who afterwards gave him his daughter Claude in marriage. Francis succeeded to the throne at the age of 21, in January 1515. Before that year ended he had won a great battle over the Swiss at Marignano, and taken possession of Milan as his duchy, on a right derived from his grandfather Valentine. The following year was chiefly spent in allying himself to his former enemies the Swiss, and with the Venetians and the Pope, the better to be prepared against the formidable opponent who at the same time appeared in the political horizon, Prince, afterwards the Emperor, Charles V. Both became candidates for the imperial crown on the death of Maximilian in 1519, and Francis was defeated. It was at this period the meeting of the Field of the Cloth of Gold took place between our own Henry VIII. and Francis, between Guisnes and Ardres. War broke out in 1521 between Charles and Francis, by the latter attempting to recover Navarre for the family of Jean d'Albret, and to support the lord of Bouillon against the emperor; and which ended in a combination against him of the emperor, the King of England, and the Pope, in 1521. Milan and Genoa were lost; but in other parts the French arms steadily maintained themselves. In 1524 the French were defeated on the Sesia, and Bayard fell—'the knight without fear and without reproach.' Milan was taken by Francis in the same year; but while he was delayed before Pavia, which was most gallantly defended by Antonio de Leyra, the imperial generals acted with such vigour and skill in reorganizing their forces, that they attacked him on the 24th of February, 1525, utterly defeated him, and took him prisoner. 'All is lost but honour,' wrote Francis to his mother, who now assumed the reins of government, and saved the kingdom. Francis remained a captive at Madrid until the following year, when, by the treaty of Madrid, he recovered his liberty, on engaging by his oath and honour to cede Burgundy, renounce his claims on Italy, Flanders, and Artois, marry Eleanor, queen dowager of Portugal, give as hostages two sons, &c., which engagements he determined to break when he made them. As soon as he entered France he galloped off, exclaiming, 'I am yet a king.'

War now broke out with renewed intensity; and now England and the Pope were on Francis's side. Charles accused Francis of perjury, and Francis challenged Charles to single combat. Milan and Rome were taken by the imperialists; Genoa broke from the French alliance, and before Naples and in the Milanese the French armies were destroyed by disease. Another treaty followed in 1529, the sons were ransomed, and there was a brief pause. Francis soon recommenced hostilities, by seizing Savoy in 1535, while Charles was in Africa; but, on the return of the latter, the French troops were driven out, and, after struggles of varying fortune, a cessation of arms was agreed to at Nice in 1536. An interview then took place. The French king went on board the emperor's galley, and the latter returned the visit at Aigues Mortes. A better understanding followed, and it was not until 1542, when the French ambassador was murdered at Milan, that hostilities were renewed. In the battle of Cerisoles, April 11, 1544, the French conquered; and in September following a peace was concluded at Crespi. In 1547, on the last day of March, Francis died.

The great fact of Francis's reign is his successful opposition to the universal monarchy aimed at by the house of Austria in the person of the Emperor Charles; and the support he, a Catholic and a bigot at home, gave to Protestantism in Germany, in order to weaken his rival. By Claude, his first wife, Francis had three sons and four daughters; the eldest son was supposed to have been poisoned, the next son succeeded as Henry II.; his second wife, Eleanor of Portugal, bore him no children. He is said to have owed his death to the vengeance of the husband of one of his mistresses. He encouraged those profligate manners at court which were so fully developed in succeeding reigns. As a patron of art and literature, Francis I. ranked deservedly high. He favoured Erasmus, patronized Cellini, and received the last dying breath of Leonardo da Vinci.

FRANCIS II. of France, born in 1543, was the eldest son of Henri II. and of Catherine de' Medici. He married, in 1558, Mary Stuart, only daughter of James V. of Scotland. On the death of his father, 10th July, 1559, Francis became king, being then 16 years of age. He intrusted the government to Francis, duke of Guise, and his brother, the cardinal of Lorraine, uncles of Mary Stuart, both Roman Catholics. This was the cause of the civil and religious wars which desolated France for half a century. The King of Navarre, and Louis, his brother, prince of Condé, conspired against these foreign ministers, and joined the Protestants. In March 1560, the Guises removed the king and court to the castle of Amboise: the king named the Duke of Guise lieutenant-general of the kingdom, and a number of persons were arrested and executed. Soon afterwards the edict of Romorantin was issued, which constituted the bishops judges of heresy, and took the cognizance of this offence from the parliaments.

By an edict of 1559, Lutherans had been declared punishable by death. Extreme measures however were delayed until the king assembled the states-general at Orléans, when the Prince of Condé, on his arrival, was arrested on the charge of a conspiracy, and condemned to lose his head; but he was saved by the death of the king, 5th December, 1560, after a reign of only 17 months. He was succeeded by his brother Charles IX., then a minor.

FRANCIS I., Emperor of Germany, born in 1708, was the son of Leopold, duke of Lorraine, who was the son of Charles V. of Lorraine, and of Eleonora Maria, daughter of the Emperor Ferdinand III. Francis's mother was the Princess of Orléans,

niece of Louis XIV. On the death of his father in 1729, Francis succeeded him as duke of Lorraine and Bar. In consequence of the war of the Polish succession, Lorraine was ceded to Stanislaus Leczinski, father-in-law of Louis XV, to revert after his death to the crown of France, and Francis received Tuscany in exchange, which duchy became vacant by the extinction of the house of Medici. Francis married in 1736 Maria Theresa of Austria, the only daughter and heiress of the Emperor Charles VI. In 1740 Charles VI. died, and Maria Theresa succeeded him in the hereditary dominions of the house of Austria; she made her husband co-regent with herself, but gave him little share in the administration. He however commanded her armies in the war which she had to sustain in order to secure her inheritance. [MARIA THERESA.] After the death of the Emperor Charles VII. in 1745, Francis was elected his successor on the imperial throne. In 1748 the peace of Aix-la-Chapelle restored peace to Germany and to Europe; but in 1756 a new war broke out between Prussia and Austria, known by the name of the Seven Years' War, which was terminated by the Peace of Hubertsburg, in February 1763. The following year Joseph, the eldest son of Francis, was elected king of the Romans, and in 1765 Francis died at Innsbruck, and Joseph succeeded him as emperor of Germany; his mother retaining in her hands the sovereignty of the Austrian dominions till her death.

FRANCIS II., Emperor of Germany, Francis I. of Austria, the eldest son of Leopold II. and of Maria Louisa of Spain, was born at Florence, in February 1768. He was most carefully educated at Vienna by his uncle Joseph II., at whose death he directed the government until his father arrived from Florence. Leopold died in 1792, and Francis succeeded to his vast dominions, and was also elected emperor. It was a critical time. Joseph's reforms had excited great discontent, the Belgians were in revolt, and the French Revolution drove France to declare that year war against Austria. The first war ended in the exchange of Belgium and the duchy of Milan for Venice and Dalmatia, by the treaty of Campo-Formio. [BONAPARTE.] The second war, in coalition with Russia and England, was marked by the loss of Lombardy, and the battles of Marengo and Hohenlinden in 1800, followed by the treaty of Luneville in 1801, when the emperor's brother gave up Tuscany, and his uncle Modena. In 1804, when Napoleon declared himself Emperor of the French, Francis, foreseeing the dissolution of the German empire, declared himself hereditary emperor (instead of king) of Austria. Entering into a new coalition with Russia and England a third war began, which was marked by the French entering into Vienna, the battle of Austerlitz, and the peace of Presburg, in 1805, when Austria gave up the Venetian states and the Tyrol. The German empire, a thousand years old, was now dissolved, and Francis's title henceforward was Emperor of Austria, King of Bohemia and Hungary. In 1809, alarmed at Napoleon's encroachments, and taking advantage of his embarrassment in Spain, Francis commenced his fourth war with France, and was supported to a great extent by the people of Germany. His general, the Archduke Charles, had to abandon Vienna, the indecisive battle of Aspern was fought, with great loss on both sides, that of Wagram followed, and at last an armistice was concluded in 1809, by which Austria gave up Trieste, Fiume, and Croatia, Salzburg, and part of Galizia. In 1810 Napoleon married Maria Louisa, the daughter of Francis; and during the Russian campaign, in 1812, the Austrians rendered the French some slight aid. In 1813 Austria resumed its neutrality, and proposed to mediate between France and Russia. Napoleon refused; Francis joined the allies; helped to win the battle of Leipzig and followed the Russians and Prussians to Paris in 1814. He then returned to Vienna, where the memorable Congress began its sittings. The return of Napoleon from Elba brought Austria forth for the sixth time in war with France, when one Austrian army advanced to Lyon, whilst another Austrian army drove Murat from Naples, and re-established King Ferdinand. Francis rendered this king some further aid, in 1821, against his own subjects. He refused to interfere when the French Revolution of 1830 broke out, and thus helped to save Europe from another general war. He died on the 2nd of March, 1835, and was succeeded by his eldest son, Ferdinand. One important feature of Francis's domestic administrations was the establishment of elementary schools throughout his dominions.

FRANCIS, ST. and FRANCISCANS. St. Francis, the founder of one of the four orders of mendicant friars, called Franciscans, was born at Assisi, in Umbria, in 1182. St. Francis was at first a young man of dissolute manners, but in consequence of a fit of sickness, about the year 1206, he became so strongly affected with religious zeal that he devoted himself to solitude and mortification. His father threw him into prison, but, finding this made no impression upon him, carried him before the bishop of Assisi, in order to make him renounce all title to his father's temporal possessions, to which he at once and willingly assented. He then prevailed upon a considerable number of persons to devote themselves, as he had done, to the poverty which he considered as enjoined by the gospel, and drew up an institute, or rule, for their use, which was approved by Pope Innocent III. in 1210, as well as by the Council of Lateran held in 1215. His order increased so fast, that when he held a chapter in 1219 near five thousand friars of his order were present. He died at Assisi in 1226. He was canonized by Pope Gregory IX., and October 4th, the day of his death, was appointed as his festival. The *Franciscans* were also called *Grey* or *Minor Friars*, from their grey clothing and their humility. The order came into England in or about 1219. At the Dissolution they had 66 conventual houses in England.

FRANCIS, REV. DR. PHILIP, was the son of the Rev. John Francis, dean of Lismore and rector of St. Mary's, Dublin, in which city Philip was born in the early part of the last century. Philip was educated at the university of Dublin, and then entered the church. About 1750 he

came over to England, and set up an academy at Esher in Surrey, where Gibbon was for a short time one of his pupils; but the historian says, 'Francis preferred the pleasures of London to the instruction of his pupils.' Here he published his translation of Horace, which continues to be reprinted. He also translated the orations of Demosthenes and Æschines, and wrote tragedies and political pamphlets. He was chaplain to Lord Holland, and assisted in the education of his son Charles Fox, the distinguished orator. He died in 1773.

FRANCIS, SIR PHILIP, the son of the Rev. Dr. Philip Francis, was born in Dublin, Oct. 22, 1740. In 1750 he was placed at St. Paul's School, London. In 1756 he was appointed to a place in the office of his father's patron, Mr. Fox, then secretary of state, and afterwards held various other offices. In June 1773, he was appointed one of the civil members in council for the government of Bengal, with a salary of 10,000*l*., which he resigned in 1780, after a quarrel and duel with the Governor-general Warren Hastings, in which Mr. Francis was wounded. He then returned to England, and in 1784 was elected member of parliament for Yarmouth in the Isle of Wight. He supported the Whig opposition. Though the house refused to allow him to form one of the managers of the impeachment against Warren Hastings, his personal enemy, his co-operation was invited by the managers, and he took an active share in the business. When the war with France broke out Mr. Francis adhered to the party of Fox and Grey, and was one of the first and most active members of the famous association of the Friends of the People. At the new election in 1796 he failed. In 1802, however, he was returned for Appleby. He now distinguished himself in opposition to the slave trade, and, we may add, in opposition to his own private interest. On the formation of the Grenville administration, Mr. Francis was made a knight of the bath, 29th October, 1806. He retired from parliament in 1807, and afterwards occupied himself with occasional political pamphlets and contributions to the newspapers. In 1816 appeared Mr. John Taylor's publication entitled 'Junius identified with a distinguished Living Character,'—Sir Philip Francis. It may be affirmed, that no case half so strong has yet been made out in favour of any of the other persons to whom the 'Letters of Junius' have been ascribed. Sir Philip Francis died in London, Dec. 22, 1818.

FRANCISCANS. [Francis, St.]

FRANCKE, a celebrated German philanthropist, was born at Lübeck, in 1663. In 1691 he became professor of oriental languages at the university of Halle, and soon afterwards professor of divinity and pastor of the parish of Glaucha, a suburb of Halle. The wretched state of his parishioners, who were sunk in the most abject ignorance and poverty, gave the first impulse to his philanthropic exertions. He began by teaching the children, whom he supported at the same time by small donations. He was assisted by the contributions of many charitable persons, and gradually extended the sphere of his beneficial activity. In 1698 he laid the foundation of the Orphan Asylum at Halle, though he had scarcely any means of completing the edifice. It frequently happened that at the most critical moments he received by post large sums from known or unknown benefactors. Francke died in 1727. Several important educational establishments at Halle, comprising education for all classes, owe to him their foundation and bear his name. One of these, the Cansteinian Biblical Institution, founded by Baron Canstein, was the forerunner of Bible Societies. This institution sent out, from 1712 till 1834, more than two millions of Bibles, and above six millions of New Testaments. The profits go to the support of Francke's institutions.

FRANCKLIN, THOMAS, D.D., was born at London in 1721. He was educated at Westminster School, and thence sent to Cambridge, where he became a fellow of Trinity College. Afterwards he became an usher in Westminster School. In 1750, he was chosen Greek professor in the University of Cambridge. He was presented by his college, in 1758, to the livings of Ware and Thundridge in Hertfordshire. He was the author of sermons, poems, translations, &c. His translations of Sophocles and Lucian are still remembered.

FRANCO, BATTISTA, called Semolei, a painter and engraver, was born at Udine about 1498, and died at Venice in 1561. Though of the Venetian State, Franco was of the Florentine school. He was a great imitator of Michel Angelo, with whose style of design he combined some of the excellences of Venetian colour.

FRANCOA'CEÆ, a very small natural order of Exogens, consisting of the genera *Francoa* and *Tetilla* only. They are South American herbaceous plants. The station of *Francoaceæ* in a natural arrangement is unsettled. *Rosaceæ* and *Crassulaceæ* seem to be the favourite orders to which they are approximated; but we rather regard them as a part of the albuminous subclass, serving to connect *Papaveraceæ* with *Droseraceæ* and *Primulaceæ*.

FRANCO'NIA (*Franken*, or *Frankenland*), formerly a circle of the German empire, was bordered S. by Swabia and Bavaria, E. by Bohemia and the Upper Palatinate, N. by Hesse and Thuringia, and W. by the Lower Palatinate and the circle of the Upper Rhine. Its area was about 10,290 square miles. The greater part of it is now included in the kingdom of Bavaria, of which it forms the three circles of Upper Franconia, Middle Franconia, and Lower Franconia, the united area of which is 9044 square miles. The total population in 1843 was 1,579,000.

FRANEKER. [Friesland.]

FRANKALMOIGNE. This tenure is thus described by Littleton (sec. 133): 'Tenant in Frankalmoigne is when an abbot or prior, or other man of religion, or of holy church, holdeth of his lord in Frankalmoigne; that is to say, in Latine, *in liberam eleemosinam*, that is, in free almes. And such tenure beganne first in old time. When a man in old time was seised of certain lands or tenements in his demesne as of fee, and of the same land infeoffed, an abbot and his covent, or prior and his covent, to have and to hold

to them and their successors in pure and perpetual almes, or in frankalmoigne; or by such words, to hold of the grantor, or of the lessor and his heires, in free almes: in such case the tenements were holden in frankalmoigne.' From this it appears that lands which are held by religious bodies, or by a man of religion, are held by tenure; but neither fealty nor any other temporal service is due. The spiritual services which were due before the Reformation are described by Littleton in s. 135.

On this section (s. 135) Coke remarks:—'Since Littleton wrote, the liturgie or book of Common Praier of celebrating divine service is altered. This alteration notwithstanding, yet the tenure in frankalmoigne remaineth; and such prayers and divine service shall be said and celebrated as now is authorized.' 'And albeit the tenure in frankalmoigne is now reduced to a certaintie contained in the book of Common Prayer, yet seeing the original tenure was in frankalmoigne, and the change is by generall consent by authority of parliament (2 Ed. VI. c. 1; 5 & 6 Ed. VI. c. 1; 1 Eliz. c. 2), whereunto every man is party, the tenure remains as it was before.' The statute of 12 Charles II., which abolishes military tenures, expressly excepts tenure in frankalmoigne.

FRANKENBURG. [ERZGEBIRGISCHE KREIS.]

FRA'NKENIA, a genus of plants, the type of the natural order *Frankeniaceæ*.

F. pulverulenta, or the Powdery Sea-Heath, grows in the sand by the sea-shore in many parts of Europe and Asia; it is occasionally found on the coast of Sussex in England, but is very rare.

F. lævis is a native of the muddy salt-marshes by the sea-coast, in many parts of Europe and the Canary Isles. In England it is found principally on the eastern coast, and flowers in the months of July and August. The flowers are generally flesh-coloured, but sometimes white, with yellow claws.

Don enumerates sixteen species of this genus, besides those already named as being found in Great Britain. Of those not British plants the majority occur in Africa and Australia, and some are found in South America.

FRANKENIA'CEÆ, a small natural order of Exogens, allied to *Silenaceæ* and *Linaceæ*. The species are chiefly found in the south of Europe and north of Africa; they however occur in various other parts of the world; one species from Australia, *Frankenia pauciflora*, remarkable for the size of its flowers, is a very pretty green-house shrub.

FRANKENSTEIN is a town in the Prussian government of Breslau, situated on the Pausebach, in 50° 52′ N. lat., 16° 50′ E. long. It is a well-built town, surrounded by walls, and has four suburbs, an old ruined castle, a spacious market-place, several churches, a hospital, barracks, a picture gallery, and a botanical garden. The population is about 5700. The manufactures consist of woollen stuffs, linens, leather, stockings, tobacco, liqueurs, &c.

FRANKFORT, a government circle of Brandenburg in Prussia. [BRANDENBURG.]

FRANKFORT *on the Main* (*Frankfurt-am-Main*) is on the right bank of the Main, across which there is a stone bridge which unites it with the suburb of Sachsenhausen. It lies in 50° 6′ N. lat., and 8° 36′ E. long. The old walls and ramparts with their stagnant ditches were razed between the years 1806 and 1812, and the site converted into spacious park-like grounds; the glacis too is now covered with vineyards and gardens, which are externally bounded by a broad road; and beyond this road the adjacent ground is embellished with a profusion of villas, pavilions, and private gardens. The chief entrances are by nine large gates. In front of the north-eastern entrance is the monument erected by Frederick William II., king of Prussia, to the memory of the Prince of Hesse-Phillipsthal and his gallant followers. The Bockenheim gate, which is the western entrance, is built on the model of the temple of Apteral Victory at Athens; and the Upper-Main gate, on that of the porches of the Campus Militum at Pompeii. The Eschenheim gate, the north-western entrance, is the only specimen extant of the ancient gates; it is a lofty massive tower, crowned by five turrets, and is a fine specimen of the German architecture of the fourteenth century.

Frankfort, inclusive of Sachsenhausen, contains a population of about 57,000, of whom about 5000 are Roman Catholics, 3500 Jews, and the rest Protestants. There are 6 large and 14 minor squares or open spaces, and above 220 streets and lanes, and there are 115 fountains and wells. The places of worships are 17 in number. The city is divided into 14 quarters, numbered from A to O. The right bank of the river is edged by a spacious quay, behind which lies an uninterrupted line of buildings.

The most remarkable building in the town is the Römer, or town-hall, an irregular structure, with lofty roofs in the old Frankish style. Under its roof is the Wahlzimmer, or Hall of Election, in which the electors and their representatives were wont to assemble and partly conduct the business of electing the emperors of Germany. Next to it is the Kaisersaal, or Imperial Hall, where the emperor, upon his election, held his public dinner, at which he was waited upon by the counts and the high officers of the empire. There are niches in this hall which contain portraits of the emperors of Germany from Conrad to Leopold II. The Römer is situated on the western side of the Römerberg, an irregular open space or square, which has also much of historical interest attached to it.

The Saal Hof, a gloomy modern building; the Braunfels, used as a commercial exchange; the spacious palace of the prince of Tour and Taxis; the ancient house of the Teutonic Knights in Sachsenhausen; the Stone House, a fine remnant of the middle ages; the Fürsteneck, one of the oldest buildings in Frankfort; the Städel-Museum of Pictures; the Senkenburg Museum of Natural History; the theatre; the public library; the academy of arts and sciences, and many hospitals and asylums, are among the chief buildings of the city. Frankfort contains a considerable number of institutions devoted to science, art, and education.

The church of St. Bartholomew, formerly the

cathedral, is a Gothic structure, begun in the time of the Carlovingian princes, but not finished till the middle of the fourteenth century. Its colossal tower, 160 feet in height, was begun in 1415 and finished in 1509. The colossal statue of the patron saint in this church is a fine piece of sculpture. On the right of the grand choir is the chapel in which the electors accepted the German emperor elect as their sovereign after he had been crowned and anointed at the high altar. At a short distance north of the town is the public cemetery, laid out like a pleasure-ground with shrubs; and adjoining it an equally well-arranged burial-place for the Jewish community. Dannecker's statue of Ariadne is in a garden near the Friedburg Gate.

With the exception of Sachsenhausen and its 5000 inhabitants, who are principally agriculturists, gardeners, and day labourers, the citizens of Frankfort derive their subsistence from commerce, money operations, and manufactures. It is a place of considerable transit for German and foreign produce. The chief articles of trade are wines, English, French, and Italian goods, Bavarian timber, German wools, colonial produce, and German manufactures. The chief manufactures are carpets, galloon, tobacco, cards, cottons, silks, printer's black, &c.

The city of Frankfort possesses a territory, which comprises an area of about 91 square miles. Charlemagne built a palace in the town, in which he held a council of the church in the year 794. Lewis the Pious surrounded it with walls and ditches in 838. A palace, called the Römer (Roman palace), was built here by its sovereigns, who held their courts of ceremony under its roof from time to time, though it was not their fixed abode. In the records of the middle ages Frankfort is mentioned as one of the principal cities in the German empire. A golden bull confirmed the privilege which Frankfort had long enjoyed, of being the place of all imperial elections. The townsmen gradually increased their powers and possessions down to the treaty of Westphalia, which recognized all its immunities, and it was taken under the special protection of the empire by the imperial rescripts of 1682 and 1683. The Emperor Charles VII. resided here from 1742 to 1744, and the German diets were at that period transferred to Frankfort from Ratisbon. Frankfort was made a Grand Duchy by Napoleon; but a resolution of the congress of Vienna in 1815 re-established the city of Frankfort and its former territory as a free state.

The small portion of territory which Frankfort possesses beyond its walls lies immediately round them on both sides of the Main; it is quite level, and its soil, a deep sand covered with a crust of lava, has been at every point brought into a high state of productiveness. It is watered by the Main, and raises corn, though not in quantity sufficient for the consumption; potatoes, vegetables, fruit, and wine; many horned cattle and sheep are also bred. The inhabitants of the eight villages are partially employed in manufacturing and mechanical pursuits within the walls of the city itself; but the most lucrative occupation they follow is that of carriers through many states of Germany.

The constitution is democratical, and vests the sovereign power in the burgesses. This power is delegated to three superior authorities: the senate, the permanent committee of burgesses, and the legislative body. The public income and expenditure are each estimated at about 70,000*l.* annually. As a member of the Germanic Confederation, Frankfort furnishes a contingent of 479 men to the army of the Confederation.

Since the various insurrections in the German states in March 1848, Frankfort has been the seat of a Diet, or Parliament, the business of which is to establish a new German empire; but the proceedings have hitherto been distracted by the conflicting views of rival parties.

FRANKFORT *on the Oder* (*Frankfurt-an-der-Oder*), the capital of the circle of Frankfort, is pleasantly situated on the left bank of the Oder, and surrounded on the land side by vine-clad heights and gardens, in 52° 22′ N. lat., and 14° 46′ E. long., at a distance of about 48 miles south-east from Berlin. It is regularly built, encircled by walls with towers, five gates, and a ditch, and has three suburbs, one of which, the Damm, lies on the left bank of the Oder, which is traversed by a bridge of wood. The population is about 25,000. Frankfort contains a market-place, six Protestant chapels, a Roman Catholic chapel, a synagogue, a university, a gymnasium, a grammar-school, many minor schools, several hospitals and asylums, and other buildings. The manufactures of the town consist of wines, mustard, brandy, tobacco, sugar, gloves, stockings, linen, leather, &c.: its trade is extensive, and the three periodical fairs, instituted in 1253, are well frequented, particularly by Polish dealers.

FRANKFORT. [KENTUCKY.]

FRANKINCENSE is the produce of the *Abies excelsa*, *Pinus abies*, or common Spruce Fir, from which it either exudes spontaneously or more abundantly from incisions of the bark. When it first flows out it is liquid, but on exposure to the air concretes, and is collected during autumn and winter. It occurs in two states, in tears (*Thus*, or *Olibanum sylvestre*), and in large irregular lumps, or compressed cakes. When recent, the colour should be white, or only inclining to yellow, subdiaphanous, soft, tenacious, and glutinous: by the action of time it becomes hard, and even friable, the colour having deepened into an orange hue. By the heat of the hand it softens, and by a higher temperature liquefies. It possesses a turpentine-like odour and taste. It is insoluble in water, but completely soluble in alcohol with the aid of heat.

It consists of two kinds of resin mixed with oil of turpentine. By melting it in water, and straining it through strong cloths, it is deprived of much of its oil, when it is termed *Pix arida*, or Burgundy Pitch.

It is scarcely now used internally, but is irritant and diuretic. Externally it is rubefacient, and consequently enters into the composition of many plasters.

FRANKLIN, BENJAMIN, born at Boston, in New England, January 6, 1706, was the son of a tallow-chandler, in humble circumstances, but intelligent and strong-minded. Benjamin was apprenticed to his brother, a printer at Boston; but the two could not agree, and Benjamin took advantage of the fact that his indentures had been cancelled by mutual agreement for special private reasons, and left him. It is himself who relates, in a most honourable spirit, this dishonourable act. Prevented by his brother from finding employment in Boston, he went to Philadelphia in 1723, and worked there for a year and a half with Keimer, a printer. He went to England in 1725, on a deceptive promise of assistance to set up as a master-printer, and was compelled to work as a journeyman-printer in London. His interesting account of this period is as widely as it is deservedly known. In 1726 he returned to Philadelphia, as clerk to a merchant; but the latter died in 1727, and Franklin returned to his old master Keimer. Friends and credit enabled him to establish himself on his own account in 1729. The following year he married. He now engaged in literature, edited a newspaper, advocated paper currency, and in 1732 projected 'Poor Richard's Almanac,' containing the well-known maxims, which, collected under the title 'The Way to Wealth,' obtained uncommon popularity, and have been translated into various languages.

In 1732 he set on foot the first public library of Philadelphia; in 1738 he established the first association for extinguishing fires; and, at a later period, the first Fire Insurance Company; in 1749 he raised subscriptions for the foundation of a public academy, the origin of the present university of Pennsylvania; in 1752 he raised subscriptions and procured an auxiliary grant from the legislature to establish the first hospital in Philadelphia; and in 1754 he proposed a plan for the union of the American provinces against invasion, in which a germ of the future Union may be found.

As a philosopher, his name is indissolubly linked with the history of electricity, in which he was one of the most active, patient, and successful experimenters; and his industry was rewarded in 1752 by the discovery of the identity of the electric fluid and lightning. He immdiately proceeded to turn his discovery to account by publishing a plan for defending houses from lightning by the use of pointed conductors.

The increasing estimation in which he was held was manifested in his successive appointments to different offices. In 1736 he was made clerk to the General Assembly of Pennsylvania; in 1737, postmaster of Philadelphia; in 1747 he was elected as one of the representatives of Philadelphia in the Assembly; in 1753 he was appointed deputy postmaster-general for the British colonies. As a member of Assembly, he was soon looked up to as the head of the opposition, and to him have been attributed many of the spirited replies of the Assembly to the messages of the governors. He spoke but seldom. His speeches often consisted of a single sentence, or of a well-told and pointed story. His manner was plain and mild. And thus, with his penetrating and solid judgment, he was able to confound the most eloquent and subtle of his adversaries, to confirm the opinion of his friends, and to make converts of the unprejudiced who had opposed him.

He was sent to England in 1757, on the part of the Assembly, to manage a controversy before the privy council, and was successful in obtaining a decision that the estates of the proprietaries, Penn's representatives [PENNSYLVANIA], ought to pay their fair proportion of the public burthens. His conduct was so highly approved, that Massachusetts, Maryland, and Georgia, severally appointed him their English agent. By this time his name was well known to European philosophers. He was chosen a member of the Royal Society of London, and of several foreign scientific bodies at a later period; in 1772 he was made a foreign associate of the French Académie des Sciences, and the universities of Oxford, Edinburgh, and St. Andrews admitted him to the degree of D.C.L. On his return to America in 1762, he received the thanks of the Assembly. The friends of the proprietaries had influence enough to prevent his election in 1764 On the meeting of the Assembly however he was reappointed provincial agent in England. He was a warm opponent of the Stamp Act, and was examined at the bar of the House of Commons in 1766, when the repeal of that offensive measure was proposed. He was in consequence deprived of his postmastership, and treated with great roughness by the English ministry. On one occasion, before the privy council, being assailed by Wedderburne, then solicitor-general, in a torrent of gross personal abuse, which was received with evident pleasure by the council, he bore it in silence, and apparently unmoved. On changing his dress however, he is reported to have said, that he never again would wear that suit till he had received satisfaction for that day's insult. His next appearance in it was on the day when, as minister of the United States, he signed the treaty by which England recognized the independence of the colonies.

In 1775, having lost all expectation of bringing about a reconciliation, he returned to Philadelphia, and the day after he landed was elected a delegate to the Congress then assembled in that city. During that and the following year he was sent on a fruitless mission to persuade the Canadians to join in the insurrection. Towards the end of 1776 he was sent to France, where, in conjunction with his brother minister, Silas Deane, he succeeded in inducing the French government to form an offensive and defensive alliance with the United States, February 6, 1778. In 1785 he was recalled, at his own wish, and was succeeded by Jefferson. Soon after his return he was chosen member, then president, of the supreme executive council for the city of Philadelphia, and in 1787 delegate for the state of Pennsylvania, in the convention appointed to revise and amend the Articles of Union.

After enjoying, through a long life, an unusual share of health, the just reward of temperance and activity, Franklin was compelled in 1788 to quit public life by the infirmities of age. His

last public act was to sign, as president of the Abolition Society, a memorial to Congress, dated February 12, 1789, praying them to exert the full extent of power vested in them by the constitution in discouraging the traffic in men. He died April 17, 1790, aged 84.

Dr. Franklin's published works were collected in three volumes, with his fragment of his own life, continued by Dr. Stuber, prefixed.

FRANKLINITE, a mineral, which occurs in attached crystals, granular and massive. The primary form of the crystal is a cube; its colour is deep iron-black. The massive varieties are amorphous. It consists of oxides of iron, zinc, and manganese.

FRANKS. [FRANCE.]

FRASCA'TI, a town of the Campagna, situated on the slope of a hill 8 miles E.S.E. from Rome, has about 4000 inhabitants. On the summit of the hill, about 2 miles above Frascati, are the ruins of ancient Tusculum, of which a description is given in Gell's 'Topography of Rome.' After the destruction of Tusculum by the Romans, A.D. 1191, the inhabitants built themselves huts on the lower slope of the hill towards Rome, and covered them with 'frasche,' boughs of trees, from which the modern town has taken its name. It has some good buildings, and is a bishop's see. The air is wholesome, the place being above the region of the malaria, and the country around is planted with fine trees. But the remains of ancient buildings, among others of Cicero's Tusculan villa, and its splendid modern villas, form the great attraction of Frascati, it being a place of resort of the Roman nobility and cardinals in the summer and autumn.

FRASER, SIMON. [LOVAT, LORD.]

FRASERBURGH. [ABERDEENSHIRE.]

FRATRICELLI, or *Little Brethren*, a religious sect which arose in Italy towards the end of the thirteenth century, with the intention of obeying the laws of their founder in a more rigorous manner than they were observed by the other Franciscans. They accordingly renounced every kind of property, begged their daily subsistence, alleging that neither Christ nor his apostles had any possessions, and that these were the models St. Francis had commanded them to imitate. They went about clothed in rags declaiming against the vices of the Pope and the bishops, and foretold the reformation of the church and the restoration of the true gospel of Christ by the real followers of St. Francis. Like the Franciscans they had a kind of affiliated secondary order, called Tertiarii, or half-monks, who also went by different names in different countries. They were laymen who acknowledged the principles and to a certain extent observed the practices of the Fratricelli. Persecuted by the Pope and Court of Rome, whose vices they denounced, they were supported by princes, nobles, and the people of towns—the most enlightened in short of their day, who respected them for the austerity and consequent earnestness of their devotion. Neither death nor imprisonment could extinguish the sect, and some remnants of it existed till the reformation of Luther, whose doctrines they embraced.

FRAUDS, STATUTE OF. [STATUTE OF FRAUDS.]

FRAUNHOFER, JOSEPH, a distinguished optician of Bavaria, was born at Straubing in that kingdom, in 1787, of parents in humble life; and, by their death, he was left an orphan when 11 years of age.

He had been accustomed to labour from his childhood, and he was early engaged as an apprentice to a manufacturer, yet he found means, without the aid of an instructor, to supply in a certain degree the deficiencies of his education, and to make some progress in the study of mathematics. Some persons of rank and fortune, being struck with admiration on discovering the efforts he had made, in the midst of many adverse circumstances, to cultivate the sciences, procured for him an introduction to the celebrated Reichenbach, who received him, he being then about 20 years of age, into the great manufactory for the construction of mathematical and philosophical instruments which that artist had established at Benedictbaiern, near Munich. In this situation Fraunhofer had ample scope for the exercise of his talents; and he distinguished himself as much by his inventive genius as by his skill in executing the mechanical processes on which he was employed.

Fraunhofer was a member of the university of Erlangen and of the Royal Academy of Sciences at Munich; and in 1822 this academy appointed him keeper of the Museum of Physics. The King of Bavaria conferred on him the order of Civil Merit, and the King of Denmark that of Danebrog. He died in 1826 in the 39th year of his age.

His most remarkable discovery was that of the existence of a series of dark lines in the spectrum produced by the refraction of the sun's light in a prism of glass or other transparent medium. He observed similar black lines in the spectra of the moon, Mars, Venus, and some of the fixed stars; also in the spectra formed by the two polarised pencils produced by a prism of Iceland spar.

Fraunhofer made experiments on the phenomena arising from the interference of light in passing through small apertures of different forms, and through wire gratings. He also observed the remarkable spectra which are produced by two wire frames placed one behind the other, the wires crossing one another at right angles: the aperture through which the light proceeded was circular, and the coloured spaces, which were seen on a dark ground, are described as being very brilliant. An account of the experiments on the inflexion of light were published in 4to. at Munich, under the title of 'Neue Modifikation des Lichtes durch gegenseitige Einwirkung und Beugung der Strahlen, und Gesetze derselben.' In the 'Astronomische Nachrichten' is a memoir by Fraunhofer on halos, parhelia, and the like phenomena.

FRAUSTADT. [POSEN.]

FRAXINELLA, the common name of a plant belonging to the genus *Dictamnus*, which is referred to the order *Rutaceæ*. *D. Fraxinella*, Bastard or False Dittany, False White Dittany, Fraxinella, is found wild in the south of Europe, especially in Germany, France, Spain, Austria, and Italy. The leaves, flowers, and stem of this

plant, when gently rubbed, emit a strong lemon odour, and when bruised the scent is more powerful. The volatile oil from this plant is evolved in so large quantities that it will burn when a light is held near it. The plant used in medicine under the name of *Dictamnus Creticus*, the Dittany of Crete, is the *Origanum dictamnus* of Linnæus.

There are several varieties of Fraxinella found in gardens, with white, red, and purple flowers. They will grow in any common garden soil, and may be grown from seeds, which ripen well in this country.

FRAXININ, a neutral principle obtained from the bark of the *Fraxinus excelsior*. It is obtained in slender hexagonal prisms, which are unalterable in the air. Fraxinin is very soluble in water and in alcohol, and only slightly so in æther. It has a very bitter taste, and has neither an alkaline nor acid reaction. It does not appear to have been analyzed.

FRA'XINUS, the genus under which the common *Ash* is comprehended, is a collection of arborescent plants inhabiting various parts of the more temperate regions of the northern hemisphere, both in the old and new world, but unknown in a wild state in the southern.

The ash is one of the most useful of our British trees, on account of the excellence of its hard tough wood and the rapidity of its growth. In its appearance too it is singularly graceful for a European tree, often resembling in its slender stems and thin airy foilage the acacias of tropical regions. The principal objection to the ash is the injury it does to the plants which grow in its neighbourhood, by rapidly exhausting the soil of all its organizable materials. In consequence of this, few plants will thrive or even grow very near it; and hence the impropriety of the common practice of planting the ash in hedgerows: the extent of its roots may always be distinctly traced by the languor and paleness of the crops that stand near it.

The principal varieties of the ash are :—1, the *Weeping Ash*, with all the characters of the common wild tree, except that the branches grow downwards instead of upwards, so that, if grafted upon a lofty stem, the head will soon reach the ground and form a natural arbour. This is said to have originated accidentally in a field at Gamlingay, in Cambridgeshire ; 2, the *Entire-Leaved Ash ;* 3, the *Curled-Leaved Ash*, with very short stunted branches, and deep green crumpled leaves ; 4, the *Warted Ash*. In this the stems are covered over with a great number of little grayish brown tubercles.

Besides these, the only European ash that deserves notice is the *Fr. parvifolia*, or Small-Leaved Ash. Its foliage is much finer and narrower than in the common ash; the leaflets are narrow and finely serrated, the bark is rugged, the growth slow, and, instead of the toughness so characteristic of the latter species, the branches are so brittle as to be liable to constant injury from high winds. It is however a very beautiful tree, and for ornamental purposes, where size is no object, it should be planted, especially as a single tree.

With regard to the species of American ash, we have, in the first place, to remark that they are not well adapted to this climate, being in general too ill prepared by our short cold summers to bear our winters, and moreover injured by spring frosts : circumstances much to be regretted, because some of the species prove very handsome trees. In the second place, the number of species has no doubt been greatly exaggerated by writers upon garden botany. We cannot however at all agree with a modern writer upon these subjects, who believes all the American ashes to be one and the same species.

Ornus, or *Flowering Ashes.*

The *Ornus Europœa*, or Common Manna Ash, is a small round-headed tree, with leaves resembling those of the common ash. In the summer, when the leaves are full grown, the trees become ornamented with a profusion of white delicate blossoms, which give them a strikingly beautiful appearance. The species inhabits the southern parts of Europe, especially the woods of Calabria and Apulia, and in those countries flowers in April. *Ornus rotundifolia* is universally distinguished as a second species of this genus, differing in its leaves being much longer. In flowers it is much the same. It is a native of Calabria and elsewhere in the south of Europe.

These two plants are interesting as producing the sweet laxative substance known in the apothecaries' shops under the name of manna. It is a secretion from the leaves and branches, and, according to Fée, is caused either by artificial wounds, or by the puncture of an insect. Both species yield the substance ; but, according to Tenore, that from *Ornus rotundifolia* is of better quality than the other.

FRAZE'RA, a genus of plants belonging to the natural order *Gentianaceæ*, named after John Frazer, a collector of North American plants.

F. Carolinensis, the *F. Walteri* of Michaux, is the only species of this genus. This plant is indigenous in the swamps of the Carolinas, and is found on the borders of lakes in Pennsylvania and New York. The whole plant has a very stately appearance, and in character approaches so near to Swertia that, without examining the fruit, it might be mistaken for a species of that genus. The root yields a powerful bitter, nearly as pure as that of quassia, and wholly destitute of aroma. It is fully equal in its medicinal effects to gentian, and when fresh is said to be emetic and cathartic. The roots have been imported into Europe as a sort of Calumba, and hence have acquired the name of American Calumba.

FREDERICK I., Emperor of Germany, surnamed *Barbarossa*, was born in 1121, and succeeded his uncle Conrad III. on the imperial throne in 1152. Conrad, knowing that many important and difficult affairs, both in church and state, demanded immediate attention, and that a man of no common energy was required to accomplish such a task, did not recommend to the princes of the empire his young son Frederick, but his nephew Frederick, son of Frederick, duke of Suabia, by Judith, daughter of Henry, duke of

Bavaria. Accordingly, on the 17th day after the death of Conrad, Frederick was unanimously chosen and crowned at Aix-la-Chapelle five days after. After settling the competition between Canute and Sueno for the Danish crown, in favour of the latter, he went to Italy in 1155, to receive homage, and to punish the Milanese and others who had offended him. In this, his first expedition into Italy, he, in some measure, humbled the Milanese, inflicted severe chastisement on Asti, took Tortona, which he left to utter destruction after the inhabitants had retired, was crowned king of Italy at Pavia, and advanced rapidly towards Rome, where Adrian IV. had just succeeded Pope Anastasius. The city had been excited by Arnold of Brescia to dispute the authority of the Pope. Arnold was subsequently taken prisoner, and burnt alive by the Pope. Having had an interview with the Pope, at which he consented to hold his holiness's stirrup, and having re-established his authority at Rome, and received the imperial crown from his hands, Frederick set out on his return to Germany. Having no children by his wife Adelaide, he divorced her on the plea of consanguinity, and married, in 1156, Beatrice, heiress of Burgundy, which thus passed to him. Frederick compelled Boleslaus, duke of Poland, to acknowledge himself a vassal of the empire, and in the first six years of his reign restored the empire to the same power and extent of dominion which it had under Henry III. Frederick took a terrible vengeance on the Milanese for their oppressive conduct to the towns that would not submit to them. He besieged Milan in 1158 with 115,000 troops, subdued it, and, on its again rebelling, destroyed its fortifications, and entirely broke its spirit and power by his severity.

On the death of Pope Adrian, some of the cardinals chose Victor IV., who was inclined to the imperial interests, and the others Alexander III. Frederick, who considered himself as protector of the church, called a council at Pavia, which proclaimed Victor IV. Alexander excommunicated the Emperor and all his partizans, and was himself recognized by the kings of France and England, and the estates of Lombardy. Frederick's superiority however obliged him to seek refuge in France. The emperor, with Louis the Young, king of France, agreed that a council should be held to terminate the schism in the church, by deciding between the two popes. This plan however failed. On the death of Pope Victor IV. in 1164, the choice fell on Paschal III., who was solemnly installed in the emperor's presence, and who then crowned the emperor and his consort Beatrice. Frederick's plans for the subjugation of the cities of Lombardy, who had combined against the cruelty and extortion of his officers, were defeated by a pestilential disorder, which carried off the greater part of his army, and it was with no little difficulty that he returned in 1168 from his third Italian campaign, as a fugitive. During the next six years, he was busily engaged settling the affairs of Germany, and putting down the feuds of the princes, &c. He also defeated a powerful confederacy against him, and soon afterwards married Matilda, daughter of Henry II., king of England. In 1169 Frederick prevailed on the princes of the empire to choose his son Henry, who was only five years old, king of the Romans, and he was accordingly crowned at Aix-la-Chapelle. Having appeased the disorders in Saxony, and undertaken a successful expedition against Boleslaus, duke of Poland, he prepared for the fourth time to cross the Alps. Pope Paschal had died, and the cardinals in the interest of the emperor chose for his successor Calixtus III., a man very inferior in talent to Alexander. The latter was now rapidly gaining ground. The cities of Lombardy built a new city, which they called Alexandria in honour of him. Only Genoa and Pisa remained true to the emperor. Having in vain sent the Archbishop of Mentz, with a small army to conclude peace, he himself followed; besieged Alexandria; negotiated; sent part of his army back, and at last had to fight; when the Lombards defeated him, and, it was thought, had killed him. A few days afterwards however, to the unspeakable joy of the army, he appeared again at Pavia, where the empress had already put on mourning.

He now gave up Calixtus (who was dismissed from his popedom with a rich abbey), was relieved by Alexander from the excommunication, and made peace with the Lombards for six years, which afterwards, by the treaty of Constance, assumed a more permanent character. Soon after he had himself and consort crowned at Arles, as king and queen of Burgundy. The peace of the empire now appeared established, when new troubles arose in Saxony, where Henry the Lion, its duke, formed great plans to extend his power, but was in the end forced to sue for peace, and was banished for three years. Henry accordingly went with his wife and children to his father-in-law the king of England.

A year after the peace of Constance, order and tranquillity everywhere prevailing, the emperor called a general diet at Mentz, one object of which was to establish his five sons. This diet presented a scene of unrivalled festivity and splendour. The people had some reason to share in this general congratulation. In Germany Frederick had declared Lübeck and Ratisbon imperial cities, and thereby had laid the foundation of a middle estate between the princes and the emperor, by which the power of the latter was increased, and the class of citizens elevated. Frederick's brilliant and varied life needed but one additional illustration, his devotion to religion. On the breaking out of the third Crusade, Frederick took the cross in 1188, with his son Frederick, and a number of the principal German nobles, and an army of 150,000 men, besides many thousand volunteers. Frederick penetrated into Asia, gained two victories over the Turks near Iconium, which he took, and was proceeding in his victorious career to Syria, when his eventful life was brought to a close in an attempt to swim on horseback across the river Calycadnus, where he was carried away by the current. After his death his son Frederick, duke of Suabia, took the chief command, but died of a pestilential disorder at the siege of Acre in 1191; and of the mighty army that Frederick led from Germany only a small remnant returned.

Among his varied talents Frederick cultivated letters, and left in Latin memoirs of some part of his life.

FREDERICK II., Emperor of Germany. On the death of Frederick I. he was succeeded by his son Henry, who reigned only eight years, leaving his son Frederick, a child of four years of age, who had been created king of the Romans when in his cradle. He was very carefully educated by his mother, Constance of Sicily, and acquired degree of learning very extraordinary at that age. His hereditary dominions consisted of the kingdoms of Naples and Sicily, the duchy of Suabia, and other territories in Germany.

Till the year 1209, when Frederick took upon himself the government of Lower Italy and Sicily, he was under the guardianship of Innocent III. In 1210, the emperor Otho, being excommunicated by the pope, Frederick, then fourteen years of age, was declared emperor by a considerable number of the German princes, but it was not till some years afterwards, on the retreat and death of Otho, that he became peaceable possessor of the imperial throne, and was crowned at Aix-la-Chapelle in 1215.

The events of his reign, for the most part, group themselves into two broad divisions, the one connected with his secret but unremitting endeavours to make himself master of the whole of Italy, and reduce the Pope simply to the first spiritual dignitary of Christendom; the other connected with the war for the recovery of the Holy Land. In 1220 he caused his eldest son to be chosen king of the Romans; he founded a university at Naples in 1224, assisted the medical school of Salerno, patronised Italian art and artists, and endeavoured in 1227 to obtain the Lombard crown. But the Milanese refused, reconstituted their old league with fifteen cities, and stopped all communication with Germany. They were put under the ban of the empire; whilst Frederick engaged in the crusade, and went on his first expedition, which failed, and for which he was placed under excommunication by the new Pope, Gregory VII. A second expedition however, commenced in 1228, and made in defiance of the Pope, left him master of Jerusalem and the chief places in Palestine, including the sea-ports of Tyre and Sidon. At Jerusalem he crowned himself, on the 18th of May, since no priest would crown him. The place was put under interdict by the Pope, and Frederick himself betrayed to the Sultan of Egypt. Kamel, who honourably told Frederick immediately of the act. Frederick hastened back to Lower Italy, and, after fruitless negotiations with Gregory, reconquered his hereditary estates, which the Pope had caused to be seized, and defeated all the intrigues of Gregory, who was at length obliged, in 1230, to free him from the excommunication.

The Lombards alone would not hear of terms, and a new and more terrible punishment for Frederick's ambition now developed itself. His son Henry began to conspire against him, not only in Italy, but in Germany. At a critical period Frederick suddenly appeared, and Henry, quite abashed, fell at his feet and entreated forgiveness. When however the infatuated young man made a second attempt, he was sent with his wife and child, to imprisonment for life at San Felice, in Apulia; then to Neocastro, in Calabria; and lastly to Martorano, where he died unreconciled, in the seventh year of his imprisonment. He was formally deposed at the Diet of Mentz in 1235, and about the same time Frederick married Isabella of England. His first wife Iolante had died in childbed. Although interrupted by a short contest in 1237 with Frederick, duke of Austria, the emperor steadily pursued his Italian schemes. He was now supported by the Ghibelline party, and by Ezelino, sovereign of Verona. His second son, Conrad, was elected king of the Romans, and in November 1237, at the battle of Corte Nuova, he utterly broke the Lombard power, and received the submission of all the cities, Milan, Bologna, Piacenza, and Brescia excepted.

He now made his natural son, Enzio, king of Sardinia. He was again excommunicated, 1239, by Gregory, and Frederick in return levied direct war upon the Pope, and among other acts attacked and destroyed a Genoese fleet, taking prisoners from it 100 of the prelates who were most hostile to him. This blow laid Gregory on his death-bed in 1241. About this time the Mongols penetrated into Germany, but retired after their defeat at Olmutz. Gregory was succeeded by Celestine IV., and he, after a short rule, was succeeded by Sinibald Fiesco, who, as cardinal, had been the emperor's friend, but now became as Pope his most formidable enemy. A general council was summoned by the new Pope at Lyon, and Frederick felt himself compelled to appear by his Chancellor Thaddeus of Suessa, to defend himself from heresy, and other absurd and malicious charges. The most dreadful anathema was pronounced against him, by which all his subjects were released from their oath of allegiance to him. It was sought to raise a new emperor in his place, Henry Raspe, the landgrave of Thuringen. But Frederick maintained himself bravely against all his enemies whilst justifying his conduct to Europe at large. The Lombards were kept in check, conspiracy at court defeated, and, although his son Conrad was defeated by the competitor for the imperial throne, the defeat was but temporary—Conrad overthrew him at last, and the landgrave died in 1247. An unsuccessful attempt was made by Peter de Vinears to poison him. Parma rebelled, and was lost to him, and with it he lost a fine army, great treasures, and his friend Thaddeus, in the camp formed before Parma. The Pope now caused William of Holland, a youth of twenty, to be elected emperor. Enzio, Frederick's natural son, was made prisoner by the Bolognese, and Ezelino openly joined his enemies. He sought peace from the Pope in vain. He set forth again, was victorious in Lombardy, and would probably have humbled Innocent at last, when he was taken ill at Fiorentino, and died in the arms of his natural son Manfred, on the 13th of December, 1250, in the fifty-sixth year of his age, and the forty-first of his reign.

No prince of the middle ages, Charlemagne excepted, made a more distinguished figure. En-

dowed with rare qualities of body and mind, he fought with wonderful energy against aristocracy in Germany, against democracy in Upper Italy, and against an arrogant hierarchy in Central Italy, whilst seeking to reconcile and to unite in his own southern hereditary dominions the hostile elements of six different nations.

FREDERICK III., Emperor of Germany, son of Ernest, duke of Austria, was born at Innsbruck, September 21, 1415. Whilst yet a minor, he went to the Holy Land. In 1435, in conjunction with his brother, Albert the Prodigal, he assumed the government of the duchy. In 1440 he was elected Emperor of Germany, on the death of his cousin, Albert II. In 1452 he was crowned by the Pope, and received from him the crown of Lombardy also. He did little to evince his fitness for his high position. He fought with his brother Albert, endeavoured to put down troubles in Germany and to put an end to the schism then reigning in the church, but achieved no distinction in these efforts. When Turkey threatened his dominions in 1453, he busied himself with botany. Having interfered in the affairs of the Swiss Cantons, and called in the French to his aid, the latter turned their arms against him. In Germany his reign itself was threatened by George Podiebrad, through a quarrel about the accession to the Palatinate in 1449. On the death of his ward Ladislaus, Hungary preferred George Podiebrad, and Bohemia Matthias Corvinus, though Frederick had expected both countries to have chosen him. In 1462 his brother Albert besieged him in Vienna, and it was his enemy Podiebrad who relieved him. The whole of the Austrian duchy fell to him at the death of Albert in 1463. In 1468 he went to Rome to talk about opposing the Turks, who however twice penetrated into his dominions. His wavering policy brought the kings of Hungary and Bohemia upon him, and he had to renounce all pretensions to Hungary, and give its king the investiture of Bohemia, to get rid of him. In 1477 his son Maximilian married Maria of Burgundy, the heiress of Charles the Bald. In 1485 the King of Hungary took Vienna and all Lower Austria from him, which he did not recover till the death of Matthias in 1490. At length his own death, on the 19th of August, 1493, relieved him from a position for which he was utterly unsuited.

FREDERICK WILLIAM, Elector of Brandenberg, surnamed the Great Elector, was the son of the Elector George William. Educated in retirement during the Thirty Years' War, the cruelty that prevailed, and the dangers that beset his family, greatly impressed him. In 1640, when his father died, he found his dominions in a terrible state, chiefly through the exactions of Wallenstein. He began at once to correct abuses and to restore order to the finances. In 1642 he received the investiture of Prussia from the king of Poland. In 1643 he made peace with the Swedes, who were to evacuate the greater part of his dominions. At the peace of Münster, he failed in his claims on Silesia, but obtained Magdeburg, Wallenstadt, Minden, and part of Pomerania. Through him the two great divisions of the Protestant church obtained equal rights in that famous treaty. Frederick formed an alliance with Holland, but was compelled in 1655 to join the Swedes; with whom, in the invasion of Poland, he greatly contributed to the victory of Warsaw. Russia and Austria declared in favour of Poland, and a convention was made by which Frederick obtained the entire sovereignty of Prussia. In 1678 he completed the conquest of Pomerania. There was now peace; and he made excellent use of it, in fostering the works of peace. In 1672 he aided Holland against France, by advancing into Westphalia; but he was badly served by his general, and he had to make peace with the French, who were to quit Westphalia, and pay him 800,000 livres, whilst he was to withdraw from the alliance with Holland. In 1674 he was again at war with France in support of the Emperor. He invaded Alsace, defeated the Swedes at Fehrbellin in 1675, took Stettin, and in January 1679 crossed the Frische Haff and the Gulf of Courland, with his army, on sledges over the ice, surprised the Swedes in their winter quarters, and compelled them to quit Prussia. The French king, however, compelled him to restore all his conquests to Sweden, and to make peace, by the treaty of St. Germain. Besides his other services in the Protestant cause, he received no less than 20,000 French Protestants after the repeal of the edict of Nantes, and was equally hospitable to the Waldenses. When the Prince of Orange was preparing for his descent on England, he furnished several regiments, whose chief, Marshal Schomberg, was killed at the battle of the Boyne. Frederick died in April 1688. His first wife was Louisa Henrietta, Princess of Orange, his second Dorothea, Dowager Duchess of Brunswick Lüneburg.

FREDERICK I., King of Prussia after 1701, but, as elector of Brandenburg, Frederick III., was born in 1657 at Königsberg. Frederick succeeded to his father's dominions in 1688. His first wife was the Princess of Hesse Cassel; his second, Sophia Charlotte, sister of George I., king of England. Immediately after his accession he assisted the Prince of Orange with 6000 men for the expedition to England. In 1689 he aided the emperor in laying waste the Palatinate, during the war with France, and two years later joined the great alliance against the same country. He also assisted the emperor against the Turks. In 1703 he took possession of the town of Elbing, previously mortgaged to the Great Elector. By the war of the Spanish succession he obtained the great object of his ambition, his recognition as King of Prussia, the only part of his dominions over which he held absolute sovereignty. The emperor consented to recognise his title of king on the condition that he would in all important matters aid the interest of the empire and of Austria. He crowned himself and consort Jan. 18, 1701. Frederick, as the ally of Austria, sent 20,000 men to the Rhine and 6000 to Italy, and his troops distinguished themselves at Blenheim, Turin, &c. Before the close of the war he died, Feb. 25, 1713.

FREDERICK WILLIAM I., King of Prussia, son of Frederick I., was born in 1688, and

educated at Hanover, with the electoral prince, afterward George II. of England. He served in the allied army against the French, and distinguished himself at the siege of Menin and the battle of Malplaquet. In 1706 he married the Princess Sophia Dorothea of Hanover. Retrenchment, republican plainness and austerity, strict business habits, facility of intercourse with his subjects, were the characteristics of his reign, which commenced on the 25th February, 1713. He laid the foundation of the afterwards famous Prussian army. His passion for tall soldiers became a byeword; and he kidnapped men from other states to gratify it. He encouraged the industrial arts, but hated the fine arts, sciences, poetry, &c. Let it be said in his favour, he was only expensive in his public buildings when they were strictly for the public, not for himself or court. In 1715 he declared war against Sweden, which demanded back Stettin, among other causes of quarrel. Rügen and Stralsund were taken. After the death of Charles XII. peace was restored. In the Polish war of 1733, he hospitably received Stanislaus, and offended Russia and Austria in so doing. He assisted the latter however when war again broke out with France, until the peace of 1738. He died on the 31st of May, 1740, leaving his successor, Frederick the Great, nine millions of dollars in the treasury, an army of 70,000 men, a kingdom of 2190 German square miles, and 2,240,000 inhabitants, as the materials for the future greatness of the Prussian monarchy.

FREDERICK II., or the Great, King of Prussia, son of Frederick William I. and of Sophia Dorothea, princess of Hanover, was born on the 24th of January, 1712. His father's chief object in his education was the development of military prowess; but his mother, and his chief tutor, M. Duhan, and a French lady, secretly opposed that object, and gave him a taste for polite literature. Estrangements then arose between father and son, and the former meditated leaving the throne to his youngest son, whilst the latter determined to fly to England to George II., his maternal uncle. Katt, one of his friends, incautiously let out the secret. He and the prince were seized, and both would have been put to death but for the intercession of the Emperor of Austria. As it was, poor Katt alone suffered death, and Frederick was let off after imprisonment. He was not allowed to return to court until the marriage of his sister, who had been in his counsel.

In 1733 his father obliged him to marry the daughter of the Duke of Brunswick-Bevern, and in 1734 gave him the town of Rheinsberg, where he appears to have lived happily, chiefly devoting himself to literary pursuits and to music, till his accession. He had an uninterrupted correspondence with foreign writers, especially with Voltaire, whom he admired above all others, but with whom in after years, when he had invited him to Prussia, he had a bitter quarrel. He here composed several works, one of which was the 'Anti-Machiavel,' published at the Hague in 1740. The death of his father in 1740 placed him on the throne; and the death of the Emperor Charles VI., on the 20th of October, 1740, led the way to the extraordinary and brilliant career which changed the face of Europe. The three great wars in which Frederick was engaged had for their main object the possession and permanent annexation of Silesia to Prussia. He began by asserting his claims to four principalities of that country, but he only required, on terms, from Maria Theresa, the duchies of Glogau and Sagan. She refused; he then seized Lower Silesia in December 1740, defeated her army at Mollwitz, April 27, 1741, was then joined by France and Bavaria, and won another battle at Czaslau, May 17, 1742. Peace was then concluded at Berlin on the 28th of July, and Upper and Lower Silesia, and a part of the county of Glatz, became Frederick's. The second Silesian war originated in Frederick's fears that the victorious Austrian arms would be turned against him in Silesia. He therefore secretly entered into an alliance with France, in April 1744, and with the rival Emperor Charles VII, the Elector Palatine, and the Elector of Hesse-Cassel, on the 22nd of May, 1744. On the 10th of August, 1744, he unexpectedly entered Bohemia, and took Prague, but was obliged to leave it before the end of the year. The alliance was dissolved by the death of the Emperor on the 18th of January, 1745, and the defeat of the Bavarians at Pfaffenhofen. On the other hand, Saxony and Austria combined against Prussia on the 18th of May, 1745; but Frederick defeated them on the 4th of June, at Hohenfriedburg in Silesia, then entered Bohemia, and again defeated them at Sorr, on the 30th of September, 1745, and at Kesselsdorf, on the 15th of December. The treaty of Dresden was then concluded, December 25, 1745, leaving matters pretty nearly as before.

During the eleven years' peace that followed, Frederick devoted himself with unremitting activity to the internal administration of his dominions, the organisation of the army, and to literary pursuits. With his chancellor, Cocceii, he compiled the 'Frederician Code.' Frederick also wrote 'Memoirs of the House of Brandenburg,' a concise, well-written account of his House. Another work, a didactic poem in six books, on the Art of War, is greatly esteemed. These and all his other works are in French. One of his grand objects was to improve his revenues, in order to maintain his army, which he had increased to 160,000 men.

When the war broke out between England and France in 1775, the former concluded a treaty with Frederick, the chief object of which was to secure Hanover from invasion. This led to a secret alliance between France, Austria, Saxony, and Russia, of which Frederick, having been privately informed, chiefly through the treachery of a clerk in the Saxon chancery, became once more apprehensive of the loss of Silesia. He accordingly resolved to anticipate his enemies, and commenced operations by invading Saxony on the 24th of August, 1756, which was the beginning of the third Silesian war, or, as it is generally called, the Seven Years' War. This contest was the most extraordinary and important in modern times, previous to the wars of the French Revolution. Though Frederick is the hero, the history of the war is, in fact, the history of continental Europe. Its lead-

ing events, in 1757, were, as regards Frederick, the defeat of the Austrians at Lowositz, and the surrender of the Poles at Pirna; the great victory at Prague, followed by as great a defeat by the Austrians under Marshal Daun at the same place; the invasion of Prussia by the Russians and Swedes, who retreated after Frederick had overthrown at Rosbach the French and Austrians; and, lastly, the defeat of the Austrians at Lissa, and recovery of Breslau from them. An annual grant of 670,000*l.* from England marked the opinion of its government in his favour. The chief events of 1758-9 were the defeat of the Russians at Zorndorf, in 1758, at a frightful sacrifice of life, and their success at Kunnersdorf, August 12, 1759, followed by other reverses from the Austrians; the bombardment of Dresden by Frederick, the occupation of Berlin itself by the Russians and Austrians; and the defeat of the Austrians at Torgau, when Frederick's affairs were becoming almost desperate. In 1761 Marshal Laudohn took Schweidnitz, and the Russians, Colberg. It is said that Frederick contemplated suicide at this period. In 1762 everything was changed by the death of the Russian empress, Elizabeth, on the 5th of January, and the accession of Peter III., who was an enthusiastic admirer of Frederick, with whom he immediately concluded a treaty of alliance. Peace was also made with the Swedes, and, though Peter was soon deposed, yet Catherine, who succeeded him, observed a strict neutrality during the remainder of the war. At last peace was concluded between Great Britain and France, Austria was left alone, and was obliged to conclude a peace with Prussia. Thus ended the Seven Years' War, which, after immense sacrifices of human life and treasure, left the political balance of Europe unchanged.

Frederick now seriously directed his attention to repair the evils inflicted on his dominions by the war. Meantime he continued to maintain a very large army. In 1772 he agreed to the first partition of Poland, by which he obtained all Polish Prussia and a part of Great Poland. From that time the kingdom of Prussia was divided into East and West Prussia. In 1778, on the death of the Elector of Bavaria without children, he interfered to prevent Austria from partitioning that country. By the treaty of Teschen, in May 1779, Austria consented to the union of the Franconian principalities with Prussia. In 1785, to prevent the Emperor from obtaining Bavaria in exchange for the Low Countries, Frederick formed the alliance between the German princes, called the 'Fürstenbund,' which has been considered as the masterpiece of his policy. In 1786 he concluded a treaty of amity and commerce with the United States of America. He died on the 17th of August, 1786, at his favourite palace of Sans Souci, in the 75th year of his age, and the 47th of his reign, leaving to his nephew, Frederick William II., a kingdom enlarged from 2190 to 3515 German square miles, and an army of 200,000 men.

His posthumous works, in 15 volumes, contain the history of his own times, the history of the Seven Years' War, and Memoirs, from the Treaty of Hubertsburg, 1763, to the end of the partition of Poland.

FREDERICK WILLIAM II., King of Prussia, was born in 1744. His father was Augustus William, second son of Frederick William I., upon whose death, in 1758, he was declared Crown Prince of Prussia by Frederick the Great, whom in 1786 he accordingly succeeded.

In 1787 he sent an army to Holland, and reinstated the stadtholder, whose rights the patriots had refused to acknowledge, and who had personally offended his wife, Frederick's sister. A defensive alliance between Holland, Prussia, and England, was concluded at the Hague in 1788. The same year, he, with England, prevented Denmark from attacking Sweden during the war between Russia and Sweden. By an alliance with the Porte in 1790 he offended Austria; but the latter eventually restored most of its Turkish conquests, and Austria and Prussia entered into friendly relations, and invaded France in 1792. Through the manœuvres of Catherine II. of Russia, Frederick found himself compelled in 1793 to contend with Russia in favour of Poland or to divide the kingdom with Russia. He chose the latter, and took possession of Great Poland. In 1794 the Poles rose under Kosciusko and Madalinsky, and several times defeated the Russians and Prussians, until Kosciusko was taken prisoner, and Praga was stormed by Suwaroff. What had been left of Poland by the previous partitions was now by the third partition divided between Austria, Russia, and Prussia. He made peace with the French Republic on the 5th of April, 1795, leaving to it all the Prussian territories beyond the Rhine. During this reign the Margrave of Anspach and Baireuth ceded those principalities, on purchase, to Prussia. Frederick-William died on the 16th of November, 1797. A new code of laws was introduced by him. The toleration he desired to maintain was much restricted by those about him, and especially by the religious edict of 1788.

FREDERICK WILLIAM III., King of Prussia, was the eldest son of King Frederick William II., by his second wife, Frederike Louise, princess of Hesse Darmstadt: he was born on the 3rd of August, 1770. He was educated under the eye of Frederick the Great, who was very fond of him. He succeeded to the throne on the 16th of November, 1797, having already distinguished himself against the French. In 1794 he had contracted a happy marriage with the Princess of Mecklenburg-Strelitz. The monarchy was now three times as extensive as when Frederick the Great came to the throne, but was weak in Poland, and was in debt. He first, therefore, reorganized the internal administration, struggling the while to preserve neutrality in the mighty European contest then raging. With the aid of France, however, he did not hesitate to increase his dominions, at the peace of Luneville, by the incorporation of Hildesheim and other bishoprics, &c., in return for Prussian territories previously ceded to France on the left bank of the Rhine. General mistrust against him prevailed among the European powers, on account of his French alliance; and he was nearly drawn into a war with England, on the occasion of the seizure of one of

his ships; but, before he had too far committed himself, Copenhagen was bombarded, and the Russian emperor, Paul, assassinated—events that led to material changes in the relations of the chief powers. At the request of Bonaparte, Frederick dismissed Louis XVIII. and the French emigrants from his dominions; and, when Napoleon crowned himself emperor in 1804, the Prussian king was the first to acknowledge him, and to wear the grand cross of the new Legion of Honour. All this increased against him the hostility of the legitimists of Europe. In 1805, when Napoleon's designs against England were frustrated by the new coalition of Russia and Austria with Great Britain, the Prussian king seemed almost to hold victory in his hand for the side he might espouse. He still remained neutral; in front, however, of a large army. The French under Bernadotte first violated his territory; this led to an interview with the Emperor Alexander, and eventually to the passage of a Russian army through his kingdom. Napoleon concealed his wrath, won the battle of Austerlitz, and then received the congratulations of the Prussian minister: 'Thank God! you have conquered!' 'If I had lost, he would have said the same to the Emperors of Russia and Austria,' observed Napoleon subsequently. The Prussian king was now again all French in his policy. He gave up Franconia to France, and received a compensation in Hanover in return, until peace should be made with Great Britain. Growing bolder, however, with time, he concluded in 1806 a second convention with France, in consequence of which he declared he had received Hanover as a lawful conquest of Napoleon. Of course this was followed by a declaration of war with Great Britain, which soon seized several hundred Prussian ships. The king could not at the same time fail to perceive the little real respect Napoleon had for him, when the latter formed the Rhenish Confederation without consulting so important a state as Prussia. Other provocations were given; and the spirit of the people was aroused. It was not, however, till he learned that secret negotiations were going on between France and Great Britain, at which it was agreed Hanover should be given up, that he listened to the persuasions and offers of Russia, and demanded from Napoleon the evacuation of Germany by the French armies. Napoleon refused, and war began. Frederick was supported by Saxony, Hesse Cassel, Brunswick, &c., as well as by Russia.

The war broke out on the 1st of October, 1806: a fortnight afterwards the glory of the Prussian name was prostrated on the field of Jena. Another fortnight, and Napoleon entered Berlin. On the 14th of June, the fate of Prussia was decided in the field of Friedland, when nearly the whole kingdom fell in a few days into the hands of the French. Frederick William and Alexander now sued for peace, which was settled at the memorable meetings of the three sovereigns on the raft at Tilsit. By the new treaty of July 7th, Frederick lost all the territories west of the Elbe, and nearly the whole of his Polish dominions—in fact, the greater part of his kingdom. Frederick was also to reduce his army to 40,000 men, and was to pay nearly six millions sterling to France. The king, on his return to Berlin in 1809, when the French evacuated it, made many internal reforms of a popular kind. He abolished the last remnant of peasant bondage, declared merit, talent, and learning the sole qualifications for the public service, and rendered the municipal corporations open and in a measure self-governing. The military system was radically altered. Every able man was bound to fight in case of necessity, and to serve in the army for three years. The finances were gradually recruited by the most extreme economy, in which the king set a worthy example to all.

In 1812 the king had to appear at Dresden among the potentates who attended the emperor, and to send 20,000 men with him onwards to Russia. These fought well until the retreat, when suddenly their commander, York, made a truce with the pursuing Russians, and they were allowed to retreat into Prussia. York's conduct was disavowed; but Napoleon knew what it meant. On the 28th of February, 1813, the king signed a treaty of alliance with Russia, and on the 17th of March following roused the whole country, as one man, by his famous proclamation against the French. The Prussians and Russians were beaten at Lützen on the 2nd of May, and at Bautzen on the 20th or 21st of May. Negotiations now took place ineffectually. The war recommenced. Sweden and Austria were now with the allies. Denmark had joined France. The allies had, it is said, 500,000 men, including above 200,000 Prussians; Napoleon much less. Having gained another victory at Dresden, the French were afterwards beaten in a series of battles. The Prussian general, Blücher, was now in the ascendant. At last, on the 16th, 18th, and 19th of October, 1813, the French power was broken before Leipzig. France was now invaded, and numerous battles were fought, and at length the allied armies stormed the fortifications of Paris, gained the battle of Montmartre, and on the day following, the 31st of March, 1814, entered Paris. On the 2nd of April Napoleon was deposed by the Senate.

Frederick, Alexander, and Blücher, visited London at this time. After a triumphal entry into Berlin, Frederick proceeded to the Congress of Vienna. Here he received back the grand-duchy of Poland, nearly all his former German possessions, and other territories, as well as the larger half of Saxony, whose king was then a prisoner. He also obtained Swedish Pomerania in exchange for Lauenburg. When Napoleon returned from Elba in 1815, he aimed his first blow at Blücher, and won the battle of Ligny; Blucher however retreated in good order to Wavre, and was able to appear at Waterloo in time to follow up and secure the victory. Frederick William signed, with the other powers, the second treaty of Paris. He eagerly joined the Holy Alliance then proposed by Alexander, and then, having gained all by the people, he broke the important promises he had made them of a representative constitution. Frederick William died on the 7th of June, 1840.

He was succeeded by his eldest son, the-present king, Frederick William IV.

FREDERICK AUGUSTUS I. II. of Poland. [Augustus II. III.]

FREDERICK AUGUSTUS I., King of Saxony, eldest son of the Elector Frederick Christian, was born at Dresden on the 23rd of December, 1750, and succeeded his father, December 17, 1763, under the guardianship of his uncle, Prince Xavier, till he assumed the government in 1768. In 1769 he married the Princess Maria Amelia of Deuxponts. Through his entire reign he did everything in his power to promote the happiness of his people. He diminished the debts of the country. Agriculture, manufactures, commerce, became flourishing to a degree hitherto unknown. The army was placed upon a better footing. Extensive support was given to the universities of Wittenberg and Leipzig. Schools were reorganized. Torture was abolished in 1770; and the punishment of death restricted and made less cruel. In 1778 Frederick Augustus joined Frederick the Great against Austria. To be united with Prussia, he joined the Fürstenbund. He refused the crown of Poland in 1791. In 1796 he acceded to the armistice and treaty of Neuchâtel with France. When the German empire was dissolved, on the 6th of August, 1806, he was obliged, as a prince of the empire, to furnish Prussia with 22,000 men against France. After the battle of Jena, Saxony was abandoned to the French, who levied a contribution of 25 millions of francs. Frederick Augustus concluded a treaty of peace with Napoleon at Bonn in Dec. 1806, assumed the title of king, joined the Rhenish Confederation, and furnished 20,000 men as his contingent. By the treaty of Tilsit in 1807 he obtained a large portion of Prussian Poland, by the name of the grand-duchy of Warsaw. In 1813 his dominions became the theatre of war. After the battle of Leipzig, Alexander treated him as his prisoner. He was then deprived of a large portion of his kingdom, which was given to Prussia under the title of the grand-duchy of Saxony. He died on the 5th of May, 1827.

FREDERICK WILLIAM CHARLES, King of Würtemberg, was born at Treptow in Pomerania in 1754, succeeded his father Frederick Eugene as duke of Würtemberg in 1797, became elector in 1803 by the decision of the German diet, and assumed the royal title on the 1st of January, 1806. In 1780 he married the princess of Brunswick-Wolfenbüttel, by whom he had two sons, William, the late king, and Paul, and a daughter Catherine, who was married to Jerome Bonaparte, king of Westphalia. In 1797 he married Charlotte Augusta Matilda, princess royal of England. The other chief events of his life, before his accession to power, were his appointment as governor-general of Russian Finland by his sister's husband, the Grand Duke Paul of Russia; and his ineffectual stand as crown prince against the French invasion of Franconia in 1796. As a ruler his chief object was to increase his territories, which had been sadly curtailed during the war with France; and he received from the diet in 1803 an ample indemnity for such losses. His adherence to Napoleon brought him, at the peace of Presburg, another large extension of territory. Having on New Year's Day, 1806, assumed the kingly title, he proclaimed a uniform administration for all his dominions, which proved unpopular. He joined the Rhenish Confederation. After the battle of Leipzig he joined the allies. Having failed to satisfy his subjects by one constitution that he proposed, he submitted another, but died before it could be discussed, on the 30th of October, 1816. All Christian subjects had equal rights in his dominions by the edict of 1806.

FREDERICK WILLIAM, Duke of Brunswick, the fourth and youngest son of Charles William Ferdinand, was born October 9, 1771. In 1786 the King of Prussia named him successor to his uncle Frederick Augustus, duke of Oels and Bernstadt, who died in 1805. After 1806 he took part in the war against France, with all the ardour which the oppression of Germany and his father's unhappy fate inspired. He was taken prisoner with Blücher at Lübeck. The peace of Tilsit and the will of Napoleon prevented him from obtaining possession of the government of Brunswick on the death of his father. At the beginning of the war between France and Austria in 1809, he raised a free corps in Bohemia. After the total defeat of the Austrians, the duke made his well-known masterly retreat in 1809 with 1500 troops to Elsfleth; from whence they proceeded to England, were taken into the English service, and distinguished themselves in the peninsula. In 1813 he returned to Brunswick, but became very unpopular. With his famous Black Hussars he joined the Duke of Wellington in 1815, and was killed at Quatre-Bras on the 16th of June, 1815.

FREDERICK I., King of Denmark, son of Christian I., was born 1473. His father had made him duke of Schleswig, Holstein, Stormar, and Dithmarsh, but his elder brother, King John, stripped him of half his dominions. When the sanguinary Christian II., his nephew, was deposed in 1523, he was declared king in his stead. Frederick annexed the isle of Gothland to his territories. In 1527 he embraced the Lutheran religion, and established it in his dominions. He died in 1533, having distinguished himself by the justice and moderation of his government.

FREDERICK II., King of Denmark, was born in 1534, and succeeded to the crown on the death of his father, Christian III., in 1558. Soon after his accession, he and his brother, the Duke of Holstein, subdued the inhabitants of Dithmarsh, who had declared themselves independent. In 1563 hostilities commenced between him and Eric, king of Sweden, which were carried on with great bitterness and cruel devastation of the two kingdoms till Eric was deposed by his own subjects in 1568. In 1570 a treaty advantageous to Denmark was concluded. Soon after this, Frederick married the daughter of the Duke of Mecklenburg and from that time gave all his care to the preservation of peace and the promotion of the welfare and happiness of his subjects. He enlarged the University of Copenhagen, and patronised learned men, among whom was Tycho Brahe, the

celebrated astronomer. He was highly respected by neighbouring princes; he received the order of the Garter from Queen Elizabeth, and concluded a treaty with James VI., king of Scotland (James I. of England), for the marriage of his daughter to that prince. He died in 1588, with a high character both public and private.

FREDERICK III., King of Denmark, son of Christian IV., was born in 1609. He was made archbishop of Bremen, but, his elder brother dying before their father, he succeeded to the crown, 1648. The nobles then greatly restricted the sovereign power in their favour. Subsequently, the people, to relieve themselves from the nobles, made the king absolute. The wars of the last reign having brought the kingdom to a very low condition, Frederick made a treaty with the Dutch, whose friendship he gained by seizing a fleet of English merchantmen. By this he obtained a subsidy, and an alliance with Holland, though it embroiled him with the Commonwealth of England. In 1657, at the instigation of the Dutch, he declared war against Sweden, whose sovereign, Charles Gustavus, laid siege to Copenhagen, and compelled Frederick to make peace on disadvantageous terms, under the mediation of England and Holland. This peace was of short duration; Copenhagen was again besieged, and was saved only by the arrival of a Dutch fleet. The mediating powers again interfered, but peace was not concluded till after the death of Charles, 1662. Frederick himself died in 1670, leaving a numerous family by his queen, a daughter of George, duke of Brunswick-Lüneburg.

FREDERICK IV., King of Denmark, was born in 1671, and succeeded his father, Christian V., in 1699, and immediately attacked the dominions of the Duke of Holstein, but soon had to defend himself at Copenhagen against Charles XII. of Sweden, brother-in-law to the duke, and to conclude peace. When Charles was afterwards a fugitive in Turkey, Frederick joined the league against him, but his troops were totally defeated in Schonen. He then invaded Swedish Pomerania with little success; and though he afterwards made himself master of the duchy of Bremen, his army, united with that of Saxony, was defeated by the Swedes under General Steenbock, who destroyed the town of Altona. In 1714 and 1718 the Danes were more fortunate, and drove the Swedes from Norway. Peace was concluded in 1720, under the mediation of England, on favourable terms, Frederick retaining the duchy of Schleswig. He died in 1730.

FREDERICK V., King of Denmark, born in 1723, succeeded his father, Christian VI., in 1746. Continuing the judicious policy of his father, he preserved his dominions in peace, and increased the wealth of his people and the public revenues by encouraging manufactures and commerce. He was equally zealous in the promotion of education and the arts and sciences. He sent a number of learned men, among whom was the celebrated Niebuhr, to the East. He was in every respect one of the wisest and best monarchs of his age, and is said to have consoled himself on his death-bed with the reflection that he had never injured a single individual, nor had a drop of blood to answer for. He died in 1766, having been twice married, first to Louisa, daughter of George II. of England, and then to Juliana, daughter of the Duke of Brunswick-Wolfenbüttel.

FREDERICKSBURG. [Virginia.]

FREDRO, MAXIMILIAN, palatine of Podolia, was a celebrated Polish author, who died in 1676. He spent his life in serving his country, in the camp as well as in the council, and occupied many important posts. His works, chiefly in Latin, are upon subjects connected with war and politics, interestingly and judiciously treated. His style procured him the name of the Polish Tacitus. His 'Proverbs and Advice,' &c., written in Polish, a work very popular in Poland, has mainly contributed to establish the reputation of Fredro, for its extraordinary knowledge of the world, and its intimate acquaintance with society.

FREE BENCH is the widow's share of her husband's copyhold or customary lands, according to the custom of the particular manor of which the lands are holden. [Copyhold.] It is generally a third part for her life, but in some manors it is a fourth part, and sometimes only a portion of the rent. By other customs she takes the whole for her life, and there are various other usages.

FREE CHURCH. [Scotland.]

FREE SCHOOL. [School.]

FREE TRADE. [Capital; Corn-Laws; Demand and Supply; Monopoly.]

FREEHOLD. A freehold estate is an interest in lands which may continue for the period of some life or lives. It may accordingly be limited to the duration of some person's life or to the duration of some uncertain period included in such life, as a fellowship, and an estate during widowhood. An estate of inheritance, that is, an estate in fee simple or in fee tail, is sometimes comprehended under the general term freehold, and freeholds are then divided into freeholds of inheritance and freeholds not of inheritance. But the proper definition of a freehold is that given at the head of this article. (Preston, *On Estates*, i. 203.)

FREEMAN. [Municipal Corporations.]

FREESTONE. [Sandstone.]

FREETOWN. [Sierra Leone.]

FREEZING is the solidification of fluid bodies by the abstraction of the heat necessary to their fluid form. Freezing mixtures are such as produce cold by the liquefaction of their solid ingredient. Such mixtures reduce the temperature of substances immersed in them on the principle of the transfer of heat, which always takes place from hotter to colder bodies when exposed to each other.

The process used by confectioners for producing cold is by the mixture of ice and common salt, which both liquefying absorb so much heat, or, in other words, produce as much cold as will reduce the thermometer from the usual temperature to zero of Fahrenheit, or even rather below it. If however freshly fallen snow be used instead of ice, then the fluidity is more suddenly produced,

and the cold is more intense. It is found that ice or snow, though exceedingly convenient substances for the production of artificial cold, are by no means necessary to it. Any salts which dissolve rapidly in water, finely powdered, are powerful freezing mixtures. Mixtures of muriate of ammonia and nitrate of potash, and of these with phosphate of soda, act strongly in this way; and so do various other salts.

The following are useful freezing mixtures, with the temperature which they produce :—

—Salt 1 part, snow 2 parts	—5° Fahr.
—Salt 2, mur. of ammonia 1, snow 5	—12° „
—Salt 10, snow 24, mur. of ammonia 5, nit. of pot. 5	—18° „
—Snow 3, dilute sulph. acid 2	—23° „
—Snow 5, concentd. mur. acid 8	—27° „
—Snow 4, concentd. nit. acid 7	—30° „
—Snow 5, chloride of calcium 4	—40° „
—Snow 2, chloride of calcium 3	—50° „
—Snow 3, fused potash 4	—51° „
—Snow 8, dilute sulphuric acid 10	—91° „

These negative temperatures indicate so many degrees below zero of Fahrenheit. In some cases they depend on the temperature of the substance before the freezing process.

In order to produce the congelation of water by a rapid evaporation from its own surface under the exhausted receiver of an air-pump, Sir John Leslie introduced in the receiver a shallow vessel containing highly concentrated sulphuric acid, above which was placed the vessel containing the water. The air being extracted as quickly as possible, the vapour, which, in consequence of the removal of the pressure, escaped continually from the water, was absorbed by the acid as fast as it rose; and the remainder of the water was speedily frozen. Dry potash, muriate of lime, or powder of basalt, will do instead of sulphuric acid. Leslie succeeded in freezing mercury by the absorption of caloric from a coating of ice in which the bulb of a thermometer was immersed.

FREEZING AND MELTING POINTS. The solidification of any one liquid, and the melting of the same substance again, take place at the same temperature. The following are those freezing and melting points, in degrees of Fahrenheit's thermometer, or many different substances :—

Sulphuric æther	— 46° Fahr.
Liquid ammonia	— 46
Nitric acid	— 45.5 to 2.04
Sulphuric acid	— 45 to + 46
Mercury	— 39
Brandy	— 7
Pure hydrocyanic acid	4 to 5
Common salt	4 to 27.5
Sal ammoniac 20 + 80 water	8
Oil of turpentine	14
Strong wines	20
Rochelle salt	21
Oil of bergamot	23
Blood	25
Epsom salt	25.5
Nitre	26
Copperas	28
Vinegar	28
Sulphate of zinc	28.6
Milk	30
Water	32
Olive oil	36
Sulphur and phosphorus, equal parts	40
Oil of anise	50
Concentrated acetic acid	50
Tallow	92 to 127
Phosphorus	108
Stearin, from hog's lard	109
Spermaceti	112
Margaric acid	134
Potassium	136
Yellow wax	142 to 149
White wax	156
Sodium	190
Sulphur	218 to 234
Tin	442
Cadmium	about 442
Bismuth	497
Lead	612
Zinc	773
Antimony	809
Silver	1873
Copper	1996
Gold	2016
Iron, cast	2786

The variations in respect to salt, and sulphuric and nitric acids, depend on the quantity of water in these substances: the weaker the solution, the higher is the freezing point.

FREIBERG; FREIBURG. [FREYBERG; FREYBURG.]

FREIBURG, a town in the circle of the Upper Rhine, in the grand-duchy of Baden, stands not far from the right bank of the Rhine, on the railroad leading from Frankfurt-am-Mayn to Basel, in 47° 59′ N. lat., 7° 53′ E. long., and has 15,000 inhabitants. The town, which has walls, pierced by three gates, is in general well built, the 'Kaiserstrasse' in particular being broad, and lined with handsome houses. Among the remarkable public edifices are—the archbishop's palace; the grand duke's palace; the government buildings; the courts of justice; the post-office; the old and the new university buildings; the town-hall, museum, granary, theatre, and house of correction. In the centre of one of the squares is a fountain surmounted by a statue of Duke Berthold III., the founder of the town. The most attractive feature in Freiburg is the cathedral or minster, probably the most perfect specimen of Gothic architecture in Germany. It is the work of the 12th century; the tower, which is 386 feet high, is peculiarly remarkable for its lightness and elegance. Holbein's 'Assumption of the Virgin,' which forms the altar-piece, is deemed his masterpiece. Connected with the university, which was founded in 1454, there is a library of 100,000 volumes, a museum, an anatomical theatre and clinical establishment, a botanic garden, &c. The town has also a gymnasium, a normal school, several other educational establishments, hospitals, and three orphan and foundling asylums.

The manufactures of Freiburg consist of leather, chicory, sugar, starch, powder, tobacco,

bells, musical instruments, &c. There are also dye-houses and bleaching establishments.

FREIGHT, the charge made for the carriage of merchandise in a ship. The amount of the freight is generally specified in the bill of lading. It frequently happens that the whole ship is hired by a merchant for a voyage, and a certain amount is paid without reference to the quantity of goods put on board. In such cases the mode of payment is part of the matter of agreement between the shipowner and the merchant, and the terms of the agreement are stated in an instrument called a charter-party. Where the shipper of goods does not stipulate for the use of the whole ship, the amount of the freight, as well as the mode of payment, may be inserted in the bill of lading. Where this is not done, the freight is due from the merchant on the delivery of the goods, and the owner or master of the ship may demand payment of the same, package by package, as the same are delivered. In almost all branches of trade however some custom has arisen which is generally followed. In London, where the greater part of the merchandise brought from foreign countries is delivered into the custody of one or other of the incorporated dock-companies, there is a custom of arresting the goods in their hands, so that they cannot pass away from the original importer until the shipowner, or some person acting on his behalf, has signified in writing that the freight has been paid. If goods are damaged on board the ship, through the carelessness or neglect of those in whose charge she and her cargo are placed, so that the owner of the ship is liable for the amount of the damage, this cannot, without the consent of the owner or master, be set off against the amount of the freight, which must under all circumstances be paid, and the merchant must afterwards substantiate his claim to compensation for the amount of the damage.

FREINSHEIM, JOHN, was born at Ulm, in 1608, and died at Heidelberg in 1660. Freinsheim wrote a supplement to Livy, with the intention of replacing the lost books of that historian. It is printed in several of the editions of Livy. He also wrote a supplement to Quintus Curtius, besides a commentary on the same writer, as well as on Florus and Tacitus.

FREJUS. [VAR.]

FRENCH BERRIES are the berries of the *Rhamnus infectorius*, which are gathered before they are ripe. They afford a pretty but fugitive yellow dye.

FRE'RET, NICOLAS, born at Paris, Feb. 15, 1688, was the son of a solicitor. He devoted his attention chiefly to the study of history and chronology. His first publication, 'Origine des Français et de leur Establissement dans les Gaules,' is written with a boldness and candour unusual at that time; but it caused his confinement in the Bastille for a short time by order of the Régent d'Orléans. He was made a member of the Academy of Inscriptions, and wrote numerous memoirs, chiefly upon difficult questions of ancient history and chronology. One of his principal works is in opposition to Newton's system of chronology. Fréret rendered considerable service to history. He died at Paris in 1749. His scattered works have been published together, 'Œuvres Complètes de Fréret,' 20 vols., 12mo., Paris, 1796. Some works of an anti-christian character, attributed to him, are deemed apocryphal.

FRERON, ELIE CATHERINE, was born in 1719, and educated by the Jesuits. He made himself conspicuous by his attacks in a literary journal on the philosophers of the 18th century, and particularly against Voltaire. His adversaries succeeded in making Freron's name synonymous with that of a scurrilous reviewer. Freron's son (Louis Stanislas), who continued the journal, then called 'Année Littéraire' till 1790, became notorious during the French Revolution as a violent Jacobin. He died in 1802, at St. Domingo, where he accompanied General Leclerc, having been nominated sous-préfet of that island.

FRESCO. A painting is said to be a *fresco*, or painted in fresco (*sul fresco intonaco*, upon the fresh coat), when it is executed in water-colours upon wet plaster. Fresco is the most noble and imposing of all methods of painting. *Colouring* in fresco was practised by the ancients, though it has not yet been shown that they *painted frescoes*. Vitruvius (vii. 3) explains the mode of preparing the walls for this species of colouring, and describes a method of varnishing them when coloured to preserve them. The earliest Italian frescoes are in the church of Assisi, in the cathedrals of Orvieto and Siena, in the Campo Santo at Pisa, and in San Miniato and Santo Spirito at Florence. These and other later frescoes are painted on four different kinds of walls: in the old Gothic buildings, on ashlar walls covered with a thin coat of plaster; in more recent buildings, on brick and rubble walls; and, in some of the most recent edifices, on lath covered with various thicknesses of plaster. The best preserved of these frescoes are on brick. There are many frescoes at Pisa, Florence, and Venice, on lath, and all are in tolerable preservation.

The method of plastering the walls for painting has been nearly uniform in most ages. The walls of the baths of Titus at Rome are covered first with a layer about half an inch thick of coarse sand and lime; above this, a thick layer of lime and pozzolana with an admixture of sand and pounded brick; the third and upper coat is of lime and pounded marble. The third loggia of the Vatican, painted by Giovanni da Udine, is much the same as this. Cennino Cennini, Alberti, and various other Italian writers, give instruction as to the mode of preparing the walls and the materials for them. The selection of the limestone to be employed in fresco-painting, both for the ground and for the white, is a matter of great importance; it should be nearly pure carbonate of lime, and should contain as few foreign materials as possible. Modern fresco-painters recommend the lime to be kept a much longer period than Cennini and other early writers direct. If it is used too fresh, it blisters, and sometimes turns the colours to a brownish red. The lime for the *intonaco* in fresco painting must not be entirely carbonated, or it would not set; a certain

degree of causticity is necessary. The picture must be executed while the *intonaco* is wet or soft; no more work therefore ought to be commenced than can be completed within the time (a few hours) that the plaster requires to harden. Numerous joints are thus necessary in a large fresco, and the judicious painter will contrive that these joints shall be identical with the inner outlines of the parts of the figures and their draperies, or any other object, so as to be no disfigurement to the work. Before laying on the *intonaco* the prepared ground must be repeatedly wetted, until it will absorb no more; then a thin moderately rough coat of plaster of sand and lime must be laid over as much of the wet surface as can be painted in one day; as soon as this coat begins to set, in about ten minutes or so, another thin coat must be laid on with a wooden trowel, both layers together being scarcely a quarter of an inch thick. Upon this coat the fresco is to be painted. This *intonaco* will be fit to paint upon in about a quarter of an hour. The first process in executing the picture is to pounce or trace the outline of the allotted work; then the painting may be commenced in thin watery washes, from the finished coloured sketch. After the first wash is finished, an interval of twenty or thirty minutes should be allowed for the absorption of the water before commencing the second painting. While the *intonaco* is wet, a repetition of the same tint will have the effect of a darker tint, as in water-colour drawing. The surface must be constantly kept moist (but not wet) while painting, or the superadded colour will not unite with what is beneath; the work is finished by glazings and washings. When the portion of the picture allotted for the day's work is completed, the superfluous portions of the *intonaco* should be carefully cut away. In the next day's operation the surface must be wetted as before, and the edging of the finished piece carefully moistened with a brush. If it should be necessary to leave the work for an hour or two, it may be kept moist by pressing a wet linen cloth against it, by means of a board padded and covered with a waxed cloth.

The colours used in fresco-painting are all ground and mixed in water, boiled or distilled; they are chiefly earths. Lime, ochres, siena, vitriol, Verona green, cobalt, chrome, ultramarine, and vermilion are the chief colouring substances employed. Sufficient of each tint is kept ready for the whole picture. The brushes and pencils are made of hog's hair and otter's hair.

The method of *fresco-secco*, or dry fresco, is thus practised:—The plastering of the wall having been completed, the whole is allowed to dry thoroughly. Before painting, the surface of the *intonaco* is rubbed with pumice-stone, and on the evening of the day before the painting is to be commenced it is thoroughly washed with water mixed with a little lime; it is wetted again the next morning, and is then ready for pouncing or tracing the outline, and painting; the wall must be kept constantly moist by means of a syringe.

Frescoes are sometimes cleaned by dry bread; sometimes by pure water, by vinegar, and by wine. Ingenious modes have been devised of removing frescoes from walls, and transferring them to canvas.

(Leopoldo Cicognara; Girolamo Baruffaldi; Cenni; *Appendices to the Reports of the Commissioners on the Fine Arts*, 1842, 1843.)

FRESCOBALDI, GIROLAMO, a distinguished composer for and performer on the organ, in the first half of the 17th century. The dates of his birth and death are not accurately known; but he was a native of Ferrara, and at the age of twenty-three became organist of St. Peter's at Rome. He may be considered as the father of the true organ style, and his writings have been more or less imitated by every orthodox composer in that style.

FRESNAY-SUR-SARTHE. [SARTHE.]

FRESNEL, AUGUSTIN JEAN, a very distinguished French mathematician and natural philosopher, was born in 1788, at Broglie near Bernay: his father, who was an architect, early communicated to him the rudiments of education, and at the age of sixteen years and a half he was admitted a pupil in the École Polytechnique, where he soon made great progress in the study of the sciences, and where he attracted the notice of Legendre by his solution of a problem which had been proposed by that mathematician as a trial of the abilities of the students. On leaving that institution he was appointed engineer in the department of the Ponts et Chaussées.

In 1823 he was made a member of the Académie des Sciences at Paris; in 1825 he was elected a Fellow of the Royal Society of London, and two years later this learned body awarded him the Rumford medal for his optical discoveries. At the time of his death, which happened in 1827, he held the post of secretary to the Commission for the Lighthouses of France, and he was succeeded in this post by his brother M. Léonor Fresnel.

The phenomena of the colours exhibited by crystallized plates when exposed to polarized light, and the rings which appear to surround their axes, were attentively examined by Fresnel; and, in conjunction with his friend Arago, he succeeded in reducing the interferences of polarized light to a few simple laws, which were duly verified by experimental analysis.

In 1819 he gained the prize which, in the preceding year, had been proposed by the Institute for the best memoir on the diffraction of light. In his Mémoire he showed that rays passing at a sensible distance from a reflecting body deviate from their primitive direction and interfere with the direct rays; and, on the principles of the undulatory theory, he ascribed the effect to a number of small waves which originate with each portion of the surface of the primitive wave when it arrives at the reflecting surface.

In a paper entitled 'Considérations Théoriques sur la Polarisation de la Lumière,' which is printed in the 'Bulletin de la Société Philomathique,' 1824, Fresnel assumes that the eye is affected only by those vibratory motions of the particles of æther which take place transversely, or in planes perpendicular to the direction of the motion of the wave. By combining the hypo-

thesis of transverse vibrations with the theory of undulations, Fresnel obtained formulæ for the intensity of reflected light at any angle of incidence. In the year 1821 Fresnel presented to the Académie des Sciences a Mémoire in which the properties of double refraction and polarization in biaxal crystals were contemplated; and he investigated what he called the 'surface of elasticity.' He also gave, for doubly refracting crystals with two axes, an indication of the general equation to a wave surface, which has since been investigated by Ampère and Maccullagh.

Apparently unacquainted with what had been previously proposed by Brewster for a like purpose, this philosopher and engineer devised several constructions of great lenses for lighthouses. He also made some experiments for the purpose of decomposing water by means of a magnet: and the method which he pursued consisted in producing a current in an electro-magnetic helix inclosing a bar-magnet covered with silk: on plunging the ends of the wire in water, he obtained some remarkable effects; but, being unable to account for certain anomalies which he observed, he abandoned the project.

FRESNES. [Nord.]

FRESNOY, CHARLES ALPHONSE DU, was born at Paris, in 1611. His father intended him to be a physician, but he devoted himself to painting. He studied at Rome, and visited Venice. He returned to France in 1656, and died paralytic in 1665. His pictures are chiefly remarkable for correctness. He is best known as the author of a didactic poem, 'De Arte Graphica,' in Latin verse, which has been translated into several languages. There are three English translations: by Dryden, in prose; by Wills, a painter, in very poor verse; and by Mason, in rhyme. The last is accompanied by annotations written by Sir Joshua Reynolds, which are pertinent and useful.

FRET, in musical instruments of the stringed kind, is a wire or ridge so placed as to mark the exact part of the finger-board to be pressed for the purpose of producing certain sounds. Frets are now never applied to any instruments except guitars, lutes, &c.

FREY, JACOB, one of the most able engravers of the 18th century, was born at Lucern in 1681. He studied under Westerhout, at Rome, who also introduced him to Carlo Maratta, with whom Frey perfected himself as a draughtsman. Frey soon obtained the reputation of the greatest engraver at Rome and of his time. He engraved in all eighty pieces, including many of the finest works of Italian art. He died at Rome in 1752.

FREYBERG, the capital of the Erzgebirgische-Kreis, and the centre of administration for the Saxon mines, stands on the Munzbach, a feeder of the Mulde, about 20 miles S.W. from Dresden, and has 12,000 inhabitants. It is surrounded by walls; the streets are regular, well built, and paved; and it has a suburb, besides the Freudenstein or Friestein, an old castle, now used as a storehouse for mining produce. There are six churches, to which a Roman Catholic church was added in 1831; and of these the Dom Kirche or cathedral is a fine specimen of the architecture of the middle ages; it contains two elaborately cut stone pulpits, and has a richly ornamented portal called the golden door, near which is the tomb of the geologist Werner. In the cathedral is a handsome monument in memory of Maurice of Saxony. Among the other buildings of note in the town are the town-hall, the high school, and the Berg Academie or Mining Academy. This last was opened in 1767, and comprises class and lecture-rooms, a museum, in which are rich collections in mineralogy, &c., a geographical and a geognostic cabinet, a museum of models of mining machines and philosophical and chemical apparatus, and an extensive library. The manufactures consist principally of articles in imitation of gold and silver ware, brass wares, white lead, gunpowder, iron and copper wares, linen, woollens, gold and silver lace, ribands and tape, leather and laces. [Erzegebirgische-Kreis.]

FREYBURG, a canton of the Swiss Confederation, is bounded N. and E. by Berne, S. by Vaud, and W. by Vaud and the Lake of Neuchâtel. Its length from north to south is 40 miles; its breadth, which is very unequal, is about 28 miles in the widest part; its area is 588 English square miles; and its population is about 92,000.

The south part of the canton is very mountainous, being covered by offsets from the great Alpine chain which divides the waters that fall into the Rhône and the Lake of Geneva from those which flow into the Aar. The canton of Freyburg belongs to the basin of the latter river.

The climate is cold in winter and subject to sudden changes of temperature in the spring and autumn. The principal productions of the soil are wheat, rye, barley, and oats; good pasture, both natural and artificial, some vines and other fruit trees, tobacco plantations, and timber or forest trees. In common years the canton produces sufficient corn for its own consumption. Potatoes are also cultivated. The cheeses made in the canton of Freyburg, especially the Gruyère, are among the best in Switzerland.

The manufactures, which are not very considerable, consist of straw-platting, tanning of leather, distilleries of kirschenwasser, tobacco-manufactories, iron-works, glass-works, and paper-mills. Coals are dug at Weibelsried and at Semsale. Turf is cut in the marshes of Morat and elsewhere.

The game consists of hares, chamois, red partridges, woodcocks, wild ducks, &c. Wolves and bears have become very rare, and stags and boars are extinct. The rivers and lakes abound with trout, carp, pike, tench, and eels.

The natives of the canton are generally robust and well made, especially in the highlands; they are sociable, intelligent, simple in their manners, docile, and inclined to superstition. The Roman Catholic is the predominant religion. Over the greater part of the canton several French or rather Romance dialects are spoken, but the educated people speak good French. In the northern and eastern districts, which approach Berne, a Swiss-German dialect is spoken.

The territory of the canton of Freyburg formed part of Burgundy in the 11th century; it was afterwards governed as a fief of the empire, and obtained many privileges. In 1450 the Duke Albert of Austria, being unable to give assistance to Freyburg, which was assailed by Berne and the other Swiss cantons, released the citizens from their oath of allegiance, and left them to shift for themselves, after having plundered them of all their silver and plate. Freyburg then remained for some years under the protection of the Dukes of Savoy. In the war of Burgundy it took the part of the Swiss against Charles the Bold, in recompense for which it was received into the confederacy as a sovereign canton or state in 1481. By that and the subsequent wars, Freyburg increased its territory to its present extent at the expense of the neighbouring lords and of the dukes of Savoy.

The government, which was originally a popular municipality, became, as the town increased its territory, aristocratic towards its new subjects, and even in the town of Freyburg and its old territory the Grand Council or legislature came to be a self-renewing body, the seats in which were monopolized by a limited number of patrician families exclusively. Successive changes have brought it nearer to the true republican form.

The capital of the canton is Freyburg. [FREYBURG.]

Morat, the head town of one of the 13 districts into which Freyburg is divided, has about 1600 inhabitants, carries on a considerable trade, has a college, a public library, a subscription library, an hospital, an orphan asylum, and a castle, built in the 13th century. The Lake of Morat is about five miles long and two broad, and about 160 feet in its greatest depth; it abounds with fish.

The local government in the districts and communes differs greatly, according to the spirit by which the inhabitants are actuated. The revenues are derived from tithes on land, from feudal rights and dues, from the forests belonging to the state, from the interest of capital, from customs and other indirect taxes, from fines, and from the mint, post office, and other rights called regalia. There is a militia of 2565 men, and also a landwehr.

For a notice of the political events of 1846–7, and of the relation between Freyburg and the other cantons, see SWITZERLAND.

(Leresche, *Dictionnaire Géographique Statistique de la Suisse; Gemälde der Schweiz, der Canton Freiburg;* Dandolo, *Svizzera Occidentale, Cantone di Friburgo.*)

FREYBURG, *Fribourg* in French, the capital of the canton, is built on several steep hills on both banks of the river Sarine, and its appearance is extremely bold and picturesque. Four bridges join the two banks of the Sarine, one of which, an iron suspension-bridge, erected in 1834, is one of the finest in the world; its length is 885 feet, and it stands 170 feet above the level of the river. The other remarkable structures in the town are —1, the town-house, in which the great council meets; 2, the collegiate church of St. Nicholas, built in the 12th century; 3, the college of St. Michel, from which the Jesuits were expelled in 1847; 4, the monastery of the Ursulines; 5, the Lyceum, annexed to which are collections of medals, mineralogy, zoology, &c.; 6, the Chancellery; 7, the convent of the Franciscans; and several other convents and churches. The population is about 9000. The scientific societies are the following:—those of archæology, of natural sciences, of medical science, and of public economy; a literary club, and a mechanics' institution. A market is held every Saturday, besides five fairs in the course of the year. Freyburg lies 16 miles S.W. from Berne, and 32 miles N.E. from Lausanne.

FRIARS, from the French *Frères*, a term in strictness meaning the brethren of a community, but more particularly applied to a new order of religious persons, who mostly sprang up at the beginning of the 13th century, and were encouraged in the hope of restoring respect to the monastic institution, the ample endowments of which had led it to degenerate from its primitive austerity, and yield to luxury and indulgence.

These friars consisted of Dominicans, Franciscans, Trinitarians or Maturines, Crossed or Crutched Friars, Austin Friars, Friars of the Sac, Bethlemites, Friars of the Order of St. Anthony of Vienna, Friars de Pica, and Bonhommes or Good Men. These last were brought into England by Edmund, Earl of Cornwall, in 1283, and a colony of them was placed at Ashridge in Buckinghamshire. The Capuchins and Observants were distinctions of the Franciscan Friars. Those friars who were destitute of fixed possessions and who subsisted by begging, were called Mendicants.

Their reputation quickly arose to an amazing height. The Pope allowed them to travel freely. They cultivated literature with the greatest assiduity and success, and became the chief ornaments of the universities. They built magnificent monasteries. Persons of the highest rank sought to be buried in their churches. Their influence, in a word, was so great, that two of the chief orders, the Dominicans and Franciscans, in effect governed Europe for nearly three centuries, for they at last became as much political as spiritual powers. And then they fell. Their ambition, arrogance, and numbers made them intolerable. In England, at the dissolution of religious houses, they fell as unpitied as the rest of the monks.

FRICTION. All surfaces have certain degrees of roughness arising from the innumerable small asperities with which they are covered; and from these, when two surfaces move upon one another, there arises a force acting in a direction opposite to that in which the surfaces move. This is friction, which is therefore a retarding force capable of destroying but incapable of generating motion, and capable of acting powerfully as a mechanical force, of which the tendency is to bestow stability. It is therefore of great importance in the useful arts of life to be acquainted with its laws, to know how to increase it, as in the construction of arches, and how to diminish it, as in the machinery of clocks, and in all works in which it is an object to economise the expense of force.

Amontons, Euler, Muschenbroëk, Desaguliers,

&c., from theoretical considerations and imperfect experiments, failed in determining satisfactorily the laws of friction: but the importance of the subject at length attracted the notice of the French Academy of Sciences, and Coulomb published, in 1781, the results of an extensive series of experiments on friction (in the 'Mémoires des Savans Étrangers'), which were commenced in 1779. Professor Vince, of Cambridge, a few years after the publication of Coulomb's memoir, made several experiments as to the uniformity of the retarding power of friction; and to that mathematician, as well as to Southern, Wood, Tredgold, Rennie, Morin, and other able experimentalists, we are indebted for many useful researches on the same subject. The determination of the quantity of friction compared with the pressure is still however uncertain, yet some few of the laws of friction may be considered as nearly established.

1. **Friction is increased by time; thus it requires** the application of a greater force to move a weight along a horizontal plane from its position of rest than to keep it afterwards moving on the same plane.

2. Between substances of the same nature the friction is proportional to the pressure; thus, if a block of oak be double the weight of another, and both, having equal surfaces of contact, are placed on one plane of uniform nature, the force necessary to move the first will be double of that requisite for the second.

3. The amount of friction is independent for one and the same body of the extent of the surface of contact.

In verifying this law it will be necessary to take care that the arrangement of the fibres may be similar in the different trials which are mutually compared; for, when a rectangular block of oak is placed on an oak table so that the fibres in both lie parallel, the friction is greater than in the case where the fibres of the block lie transversely to those of the table.

4. The friction is independent of the velocity, at least when the velocity is neither very small nor very great.

In the 'Philosophical Transactions' for 1829, Mr. George Rennie published his experiments on the friction of attrition relative to several solid substances, such as ice, cloth, leather, wood, stones, and metals. But we must refer to the Memoir itself for the tabulated results of experiments, and the author's valuable remarks thereon; and we shall only extract some of the experiments on wood and metals, as they are of the most extensive employment in machinery. The substances were drawn on a horizontal plane. The friction of red teak on red teak, when the surfaces were pressed together with weights varying from half a hundredweight to 13 cwts., was such that, on an average, there was required $\frac{1}{3}\frac{1}{2}\frac{1}{2}$ of the pressing weight to move the upper body on the lower. Black beech on black beech, pressed with weights from ½ cwt. to 10 cwts., required on an average $\frac{1}{7}\frac{1}{3}$ of the pressure to move it; and Norway oak on Norway oak, pressed with weights from ½ cwt. to 8 cwts., required on an average $\frac{1}{5}\frac{1}{6}$ of the pressure.

Comparative Amount of the Friction of different Metals under an average Pressure of from 54.25 lbs. to 69.55 lbs.

Names of Metals.	Average Weight.	Proportion.
	lbs.	
Brass on wrought iron . .	69.55	7.212
Steel upon steel	69.55	6.360
Brass upon cast iron . . .	54.25	6.745
Brass upon steel	69.55	6.592
Hard brass upon cast iron .	54.25	6.581
Wrought iron upon wrought iron	69.55	6.561
Cast iron upon cast iron . .	54.25	6.475
Cast iron upon steel . . .	69.55	6.393
Cast iron upon wrought iron	69.55	6.023
Brass upon brass	69.55	5.764
Tin upon tin	69.55	3.305

From hence it would appear that hard metals have less friction than soft ones, and that the friction of hard against hard may be generally estimated at about one-sixth of the pressure.

From his experiments on the friction of axles without unguents, Mr. Rennie remarks that, when gun-metal is loaded with weights varying from one to ten hundredweight, the friction varies nearly in the proportion of $\frac{1}{6}\frac{1}{4}$ to $\frac{1}{4}\frac{1}{8}$ of the pressure, and is scarcely affected by time; that it was increased when yellow brass, and decreased when cast iron was tried; and still more so when black lead was used between the three different metals.

Relative to unguents the experiments show that for gun metal or cast iron with oil intervening, and a weight of ten hundredweight, the friction amounted to $\frac{1}{2}\frac{1}{4}$ of the pressure, but on diminishing the incident weights the friction was diminished to $\frac{1}{3}\frac{1}{2}\frac{1}{8}$; cast iron, under similar circumstances, showed less friction, which was also diminished by hog's lard when loaded.

From hence it may be inferred that, the lighter the incident weight, the finer and more fluid should be the unguents, and *vice versâ*.

Amongst the conclusions which Mr. Rennie draws, the following are perhaps the most important.

With fibrous substances, such as cloth, &c., friction is increased by surface and time, and diminished by pressure and velocity.

With harder substances, such as woods, metals, and stones, the amount of friction is simply as the pressure, without regard to surface, time, or velocity.

Friction is greatest with soft, and least with hard substances. The diminution of friction by unguents depends on the nature of the unguents, without reference to the substances moving over them.

Subsequent to the publication of Mr. Rennie's Memoir, M. Arthur Morin, captain of artillery, commenced a series of experiments on friction at Metz, in 1831, which he continued by another series in 1832; they form the subjects of two Memoirs in the volume of the 'Mémoires de l'Institut' for 1833. The author's object was to repeat the experiments of Coulomb, with the view of either verifying or correcting them. The

amounts of friction which he obtains differ greatly from those given by Coulomb; but some doubt may be felt whether a source of error may not exist in the particular apparatus by which M. Morin obtained his values.

The following table contains some of the more important results of his first Mémoire, and relates to the friction of plane surfaces which had been some time in contact.

Names of the surfaces in contact.	State of surface.	Disposition of the fibres.	Ratio of friction to pressure.
Oak upon oak .	Dry.	Parallel.	0.60 to 0.65
Do. .	Do.	Perpendicular.	0.54
Do. .	Wet.	Do.	0.71
Elm upon oak .	Dry.	Parallel.	0.69
Do. .	Do.	Perpendicular.	0.57
Ash upon oak .	Do.	Parallel.	0.50
Fir upon oak . .	Do.	Do.	0.52
Beech upon oak .	Do.	Do.	0.53
Wild pear upon oak	Do.	Do.	0.44
Service-tree on oak	Do.	Do.	0.57
Wrought iron upon oak . .	Do.	Do.	0.62
Yellow copper upon oak .	Do.	Do.	0.62
Black copper upon oak . .	Do.	Do.	0.74
Hemp cord upon oak	Do.	Do.	0.64

Some of the above ratios are three times as great as those given by Coulomb. M. Morin's second memoir is more particularly directed to surfaces with unguents, or coatings; and here he coincides more nearly with Coulomb, attributing the difference to the mode in which the latter conducted his experiments, and which may possibly have permitted some of the lighter unguents to escape from the surfaces during the process.

FRICTION-WHEELS. [WHEELS.]

FRIDAY. [WEEK.]

FRIENDLY ISLANDS, or TONGA ISLANDS, are situated in the Pacific, between 18° and 23° S. lat., and 173° and 176° W. long. They consists of three separate groups, which are said to contain more than 150 islands. The most southern group, the Tonga-tabu Islands, were discovered by Tasman in 1643. The largest of them, Tonga, is about 20 miles long and 12 miles wide, in the broadest part. It rises about 80 feet above the sea, and its summit is a level plain. On the northern side an excellent roadstead was discovered by Cook. The central group, called the Hapai Islands, is composed of a considerable number of small islands. The largest of them is Lefooga, about 8 or 9 miles long, and 4 wide. The most northern group is formed by the Vavaoo Islands, which are likewise small and low, except the island of Vavaoo, which is about 36 miles in circumference. On its southern side is Curtis Sound, or Puerto de Refugio, one of the most spacious and safest harbours in the Pacific. These islands are remarkable for the mildness of their climate, their fertility, and the great variety of their vegetable productions. For food there are cultivated cocoa-nut-trees, bread-fruit-trees, bananas, yams, sugar-cane, and sago; the Chinese paper-mulberry-tree is cultivated for its inner bark, from which the clothing of the inhabitants is made. Hogs and dogs are numerous, and both are used for food.

Cook called these islands the Friendly Islands, because he was received by the inhabitants in a very friendly manner; but it is now well known that they intended to kill him and to seize his vessels. They are a very industrious people, and pay great attention to the cultivation of the soil, and they apply themselves also to fishing. They belong to the Malayan race. The population is estimated to amount to 200,000.

FRIENDLY SOCIETIES. All the Acts of Parliament relating to Friendly Societies were repealed and superseded by the act of 1829 (10 Geo. IV. c. 56), which, with two acts passed in 1832 and 1834 (2 Wm. IV. c. 37, and 4 & 5 Wm. IV. c. 40), the 3 & 4 Vict. c. 73, and 9 & 10 Vict. c. 27, contain the law as it now stands for the regulation of Friendly Societies.

In the years 1825 and 1827 select committees were appointed by the House of Commons to consider the laws relating to Friendly Societies. The reports made by these committees prepared the way for the enactment of 1829.

The first clause of the 9 & 10 Vict. c. 27 (3rd July, 1846) defines more particularly the purposes for which Friendly Societies may be established under the previous acts. The 3 & 4 Vict. 73, relates to the investing of money through the medium of Friendly Societies and Savings' Banks.

The following are among the benefits derived from a Friendly Society:—1, The rules are binding, and may be legally enforced. 2, Protection is given to the members, their wives and children, &c., in enforcing their just claims, and against any fraudulent dissolution of the society. 3, The property of the society is declared to be vested in the trustee or treasurer for the time being. 4, The trustee or treasurer may, with respect to property of society, sue and be sued in his own name. 5, Fraud committed with respect to property of society is punishable by justices. 6, Court of Exchequer may compel transfer of stock, &c., if officer of society abscond or refuse to transfer, &c. 7, Application may be made to Court of Exchequer by petition, free from payment of court or counsel's fee, &c. 8, Disputes settled by reference to justices or arbitrators—order of justice or award of arbitrators final. 9, Power to invest their funds in savings' bank. 10, Power to invest their funds with the Commissioners for the Reduction of the National Debt, and to receive interest at the rate of 3*l.* 0*s.* 10*d.* per cent. 11, Priority of payment of debts, in case officer, &c., of society become bankrupt, insolvent, has an execution, &c., against his property, or dies. 12, In case of death of members, payment may be made of sum not ex-

ceeding 20*l.*, without the expense, &c., of obtaining letters of administration. 13, Members are allowed to be witnesses in all proceedings, criminal or civil, respecting property of society. 14, Exemption of all documents, &c., from stamp-duty.

The regulations for the establishment and management of these societies are stated in the acts referred to.

It is unnecessary to give the tables of contributions required from members of Friendly Societies, in order to insure to their members the benefits of such institutions, as every information respecting the establishment of Friendly Societies may be obtained, free of expense, on application, through a post-paid letter, to the 'Barrister appointed to certify the rules of Friendly Societies, London.'

On the 20th of November, 1844, the number of Friendly Societies which had direct accounts with the Commissioners for Reduction of the National Debt was 428, and the amount of their deposits was 1,770,775*l.* There were besides, at the same date, 10,203 Friendly Societies which had the sum of 1,272,046*l.* invested in savings' banks.

FRIENDS. [QUAKERS.]

FRIESLAND, or VRIESLAND, the most northerly province of the kingdom of Holland, is situated between 52° 40′ and 53° 28′ N. lat., and 5° 24′ and 6° 46′ E. long., and is bounded N. by the North Sea, E. by Groningen and Drenthe, S. and S.E. by Oberyssel, and W. and S.W. by the North Sea and Zuidersee. The area is about 1027 square miles, and the population is about 230,000. The surface, as well as the soil itself, are so identified in character with those of the province of North Holland, that there cannot be a doubt that they formed one and the same country antecedently to the convulsion out of which the Zuidersee, which now separates them, arose. Friesland has no river of any note excepting the Lauwers, which falls into the gulf of that name. The other streams, the Baare, Linde, Paassens, &c., are broad rivulets of inconsiderable lengths. There are a multitude of small lakes, called Meeren; and there is a large canal from Haarlingen to Groningen. The principal occupation of the people is breeding cattle, growing corn, fishing, and digging and preparing turf for fuel. The agricultural produce is more than adequate to its consumption, and some corn is exported. The chief articles of growth are wheat, rye of superior quality, remarkably fine peas, potatoes, buckwheat, and clover seed, which last is exported largely. There are few manufactures; they include wooden clocks, woollen stuffs, linens, sail cloth, salt, paper, and tiles. Ship-building is also carried on.

The inhabitants are principally Reformed Lutherans. Their language has a greater similarity to the German than to the Dutch: in this respect, indeed, as well as in their dress and manners, they have retained much that was common to their ancestors, the Frisians. In the larger towns Dutch is spoken.

Friesland contains 11 towns, 1 market village, and 336 other villages and hamlets, and is divided into three circles (Leeuwarden in the north, and Sneek and Herrenveen in the south), and 30 gritenien, or bailiwicks. The chief town is LEEUWARDEN, with about 24,000 inhabitants, in the west; Franeker, with about 4500 inhabitants, a high school, botanic garden, and tile manufactories; Haarlingen, a seaport on the Zuidersee, with 8000 inhabitants, five churches, and manufactures of sailcloth, paper, salt, &c., and a brisk foreign trade; Dockum, a well-built town, with about 4000 inhabitants, 2 churches, a handsome town-hall, manufactures of beer, brandy, salt, &c., and a brisk trade in butter and cheese; Sneek, with about 6000 inhabitants, a town-hall, manufactures of pottery, linen, deals, oil, &c., and much trade in corn and butter; Staveren, a sea-port, once the residence of the Frisian kings, with about 2000 inhabitants; Workum, a port on the Zuidersee, with about 3000 inhabitants, chiefly engaged in shipping and fisheries; Herrenveen, with 1300 inhabitants; and Langezwaag, with 5000.

Friesland became one of the provinces of Holland in 1609. [FRISIANS.]

FRIESLAND, EAST. [AURICH.]

FRIEZE. [CIVIL ARCHITECTURE.]

FRIGATE. [SHIP.]

FRINGILLIDÆ, a family containing many genera, as the Lark (*Alauda*), the Bunting (*Emberiza*), the Bullfinch (*Pyrrhula*), the Chaffinch (*Fringilla*), the Linnet (*Linaria*), the Canary Bird, the Cross-Bills (*Loxia*), regarded by some as a distinct family, and others, as the Tanagræ and the Weaver Birds. [LOXIADÆ; TANAGERS; WEAVER BIRDS.]

As is usual among ornithologists, different authors have taken different views of the extent and constituents of this family (one of the tribe *Conirostres*, order *Insessores*, or *Passeres* of Cuvier). Mr. Vigors for example, makes the *Fringillidæ* the first and the *Loxiadæ* the last family of the *Conirostres;* whilst Mr. Swainson makes the *Fringillidæ*, including *Loxia*, the third family of the *Conirostres*, his families being as follows:—*Corvidæ*, *Sturnidæ*, *Fringillidæ*, *Musophagidæ*, and *Buceridæ*. Other naturalists, again, have given very dissimilar arrangements.

Mr. Selby, in his 'Illustrations of British Zoology,' gives the tribe *Conirostres* as the third tribe of the order *Insessores*, and regards the *Fringillidæ* as the first family of that tribe. 'This family,' he says, 'with which we commence the circle of the tribe, embraces all the numerous forms and genera commonly known by the name of *Finches* or *hard-billed birds*. They are distinguished from the more typical divisions by their inferior size, and by their short, strong, thick, and perfectly conical bill. In the aberrant forms, as might be expected, these peculiar characteristics become modified, so as to render them the means of communication with other groups, families, and orders. By Mr. Swainson the five circles of this family are thus enumerated—*Coccothraustina* and *Tanagrina* constituting the nominal or typical groups; and *Alaudina*, *Fringillina*, and *Pyrrhulina*, the aberrant. Of the second sub-family here mentioned, the British islands cannot produce any specimen.'

As this arrangement is very consonant with our own views, we will briefly illustrate it.

Order, *Insessores;* Tribe, *Conirostres;* Family, *Fringillidæ.*

1st Sub-family, *Alaudina.* Genus *Alauda,* the True Larks. Gen. *Plectrophanes,* the Lark Buntings, as the Snow Bunting. Gen. *Emberiza,* the True Buntings, as the common Bunting and Yellow Hammer, the Red Bunting, &c.

2nd Sub-family, *Fringillana.* Genus *Passer* (*Pyrgita,* Cuvier), the House Sparrow and the Tree Sparrow. Gen. *Fringilla,* the Chaffinch, the Mountain Finch. Gen. *Carduelis,* the Goldfinch, the Siskin.

3rd Sub-family, *Coccothraustina.* Gen. *Linaria,* the Linnet, the Redpole. Gen. *Coccothraustes,* the Grosbeak, the Hawfinch, &c.

4th Sub-family, *Tanagrina.* Gen. *Tanagra,* the Tanagers, divided into many subgenera or genera. (Cuvier's 'Règne Anim.,' i. p. 366.) Locality, America.

5th Sub-family, *Pyrrhulina.* Gen. *Loxia,* the Crossbill. Gen. *Pyrrhula,* the Bullfinch, the Pine Bullfinch.

The *Fringillidæ* are granivorous, although many add green herbage, pulpy fruits, and insects to their diet. They are not as a whole remarkable for power of flight, though the lark may be regarded as an exception. Many are exquisite songsters, and during the spring make our groves and hedgerows resound with their melody.

We have illustrated the *Fringillidæ* by referring to indigenous genera, containing well-known species. Were we to enumerate all the foreign genera which have been established up to the present day, we should, even by a bare recital of their names, extend this article throughout several columns; nor should we then do more than impose upon our readers a farrago of words, overwhelming to the inquirer, useless to the practised ornithologist. From what we have said we trust that the reader will be enabled to form a clear idea of the kind of birds which this family comprehends.

FRISCHES HAFF. [Königsberg.]

FRISCHLIN, NICODE'MUS, born in 1547, showed at an early age a great aptitude for the study of languages, became an accomplished scholar, and was made professor in the University of Tübingen, where he wrote his Paraphrases of Virgil's Bucolics and Georgics, and of Persius, as well as a great quantity of original poetry. He was obliged to leave Tübingen for some reason or other, and he settled finally at Mainz. In consequence, it is said, of some satirical writing, the Duke of Würtemberg caused him to be arrested at Mainz and shut up in a tower, from whence he attempted to escape, but fell from a great height, and died of the fall in November 1590. He is the author of numerous works, learned and literary. (Teissier, *Eloges des Hommes Savans;* Moreri's *Dictionary,* art. 'Frischlin.')

FRISI, PAOLO, a distinguished Italian mathematician, was born at Milan, April 13, 1728, of a family which came originally from Strassburg; and at fifteen years of age he was placed in a monastery of the Barnabites, of whose order he became a member.

From Milan he was sent to the university of Pavia, where he studied theology; and at intervals of leisure he greatly extended his knowledge of mathematics. He was afterwards appointed to give instruction in philosophy at Lodi; and while at this place he composed a treatise entitled 'Disquisitio Mathematica in Caussam Physicam Figuræ et Magnitudinis Telluris nostræ,' which his friend Donato Silva, at his own expense, caused to be published in 1751. The principals of his order, at Milan, gave him soon afterwards the appointment of professor of philosophy in the college of St. Alexander in that city; where, in 1755, he published his work 'De Existentia et Motu Ætheris, seu de Theoria Electricitatis;' and, in the same year, at Lugano, a tract entitled 'Saggio della Morale Filosofia,' &c. In the following year he accepted an appointment in the university of Pisa, which was conferred upon him by the Grand-duke Leopold; and while holding this post he published a tract entitled 'De Motu Diurno Terræ' (Pisa, 1758), which had obtained the prize proposed by the Royal Academy of Berlin. He also published 'Dissertationes Variæ' in two volumes; of which the first (Lucca, 1760) contains a tract entitled 'De Atmosphærâ Cœlestium Corporum,' and the second (Lucca, 1761) two others, entitled 'De Inæqualitatibus Motus Planetarum omnium in Orbitis Circularibus atque Ellipticis' (in two books), and 'De Methodo Fluxionum Geometricarum.'

In 1760 Frisi made a journey to Rome and Naples in consequence of a commission which he received from the Pope, Clement XIII., to examine and report upon a subject in dispute between the people of Ferrara and Bologna respecting the navigation of certain rivers. He returned to Milan in 1764, having been appointed professor of mathematics in that city, and, except occasional absences, he continued to reside there till his death. In the year 1766 he made a visit to France, and from thence he came to London, where, as well as in Paris, he received great attention from the learned. Besides the works which have been mentioned, Frisi published several others on Mathematics, Mechanics, and Architecture. In the year 1776, having previously enjoyed excellent health, he first felt the symptoms of a painful disease; these gradually increased in violence, and eight years afterwards, in the hope of obtaining relief, he underwent an operation: a mortification however ensued, and terminated his life at Milan, November 22, 1784, in his 67th year.

FRISIANS, a people of Germany, who formed part of the nation of the Ingævones. They were divided into Frisii Minores, who inhabited the lands north of the island of the Batavi—the present provinces of Oberyssel, Gelders, and Utrecht, and the greater part of the province of Holland, inclusive of the Zuidersee, which at that time was mostly dry land; and the Frisii Majores, who inhabited the land between the Yssel, Ems, and the country of the Bructeri—that is, the present provinces of West Friesland and Groningen. The old Rhine separated them from the Batavi, and the Ems from the Chauci. According to Tacitus ('Ann.,' ii. c. 24) they were the most steadfast allies whom the Romans possessed in this quarter

till the Romans made an attempt to treat them as subjects, when they became declared enemies of Rome. (Tacit. 'Ann.,' iv. c. 72, 73.) Corbulo, the Roman general under Claudius, A.D. 47, reduced them to obedience, and under Nero they were driven out of some districts on this side of the Zuidersee, which they had invaded. (Tacit. 'Ann.,' xiii. c. 54.) From this period until the fourth and fifth centuries, when they appear as members of the great confederacy of the Saxons, no mention of them occurs. We find them at this time holding the sea-coasts from the Schelde to the Elbe and Eyder, whence it has been conjectured that a variety of tribes were then comprehended under the name of Frisians. Many of them then passed over into Britain, in company with the Angles and Saxons. In 1815 East Friesland was ceded by Prussia to Hanover. West Friesland is a province of the kingdom of Holland.

FRITH, or FIRTH, a term used in Scotland to signify an inlet of the sea or an æstuary. The term *Loch* is more commonly used on the western coast. It corresponds to the Latin *Fretum* and to the *Fiord* of the Danes and Norwegians.

FRITILLA'RIA, a genus belonging to the natural order *Liliaceæ*. Of this genus the common Fritillary, *F. meleagris*, is a native of Great Britain. It inhabits meadows and pastures, and is found throughout Europe. It has flesh-coloured flowers, with numerous dark and sometimes white spots. *F. montana* grows in the mountainous districts of Europe. It has two floral leaves, opposite, and distinct from those of the stem. *F. pyrœnaica* of Sibthorp, the *F. tulipifolia* of Bieberstein, is found in Greece. The species are often cultivated in gardens on account of their flowers. They blossom in April and May, and will grow in any common garden soil.

FRIU'LI, the most eastern province of Italy, forming part of the Venetian territory, is bounded on the north by the Carnic Alps, which divide it from the valley of the Drave in Carinthia; on the north-east by the Julian Alps, which divide it from the valley of the Save; on the north-west by an offset of the Carnic Alps, which divides it from the valley of the Piave in the province of Belluno; on the west by the province of Treviso, from which it is divided by the river Livenza; on the south partly by the Dogado, or province of Venice, and partly by the Adriatic Sea; and on the east by the government of Trieste or of Istria.

The name of Friuli appears to be a corruption of Forum Julii Carnorum, the name of a Roman colony said to have been founded by Cæsar, now Cività di Friuli, on the river Natiso, one of the effluents of the Isonzo, which flows along the western side of an offset of the Julian Alps which bounds Friuli to the north-east. Alboin, who entered Italy on this side, after conquering the plains of the Po, placed his nephew Gisulfus as governor or duke of Friuli. From that time Friuli formed one of the principal duchies of which the elective monarchy of the Longobards was composed. In 1420 the Venetians conquered Friuli, and annexed it to their territories. It remained subject to Venice till the fall of that republic in 1797; it was then ceded to Austria by the peace of Campoformio; was afterwards annexed to the kingdom of Italy in 1806, but was reconquered by Austria with the other Venetian provinces in 1814. It forms a province of the Lombardo-Venetian kingdom, called 'Delegazione di Udine.'

Friuli is a very fine and interesting part of Italy. Its length is about 60 miles from the sources of the Tagliamento to the sea, its breadth is about 45 miles, and its area about 2500 English square miles. Its population amounts to 339,000, a greater number than that of any other Venetian province. The country is watered by numerous rivers, and has considerable plains in its southern part, producing abundance of corn and very good wine, while the northern part is hilly, and affords excellent pasture and plenty of game. The climate is healthy, and the inhabitants are robust and spirited. They speak a dialect of the Italian different from the Venetian; on the borders however, German and Sclavonian are spoken.

(Da Porto, *Lettere Storiche dall anno* 1509 *al* 1512, *lettera* xxi., *Descrizione della Patria del Friuli.*)

FROBEN, or FROBE'NIUS, JOHN, a native of Hammelburg in Franconia, was educated at the university of Basel, and acquired the reputation of being an eminent scholar. He took to printing as a profession, and opened a shop in Basel, probably about 1491. He was the first of the German printers who brought the art to perfection, and one of the first who introduced into Germany the use of the Roman character. Froben's great reputation was the principal motive which led Erasmus to fix his residence at Basel, in order to have his own books printed by him. Erasmus loved the good qualities of Froben as much as Froben admired the great ones of Erasmus.

There is an epistle of Erasmus extant, which is a complete memoir of Froben. It was written in 1527, on the occasion of Froben's death, which happened that year. He says that he lamented the loss of Froben, not so much because he had a strong affection for him, but because he seemed raised up by Providence for the promoting of liberal studies. Then he proceeds to describe his good qualities, which were indeed very great and numerous, and concludes with a particular account of his death, which was somewhat remarkable.

A large number of valuable authors were printed by Froben, with great care and accuracy; among which may be enumerated the works of St. Jerome, 5 vols. folio, 1516, reprinted in 1520 and 1524; those of St. Cyprian, fol. 1521; Tertullian, fol., 1521, reprinted in 1525; the works of Hilary, bishop of Poictiers, fol., 1523, reprinted in 1526; St. Ambrose, 4 vols. fol., 1527. All of these were edited by Erasmus.

FROBISHER, SIR MARTIN, an enterprising English navigator, was born at Doncaster, in Yorkshire, of parents in humble life, but it is not known in what year. He very early displayed the talents of a great navigator, and was the first Englishman who attempted to find out a north-west passage to China. After fifteen years of continued disappointment, the Earl of Warwick and others enabled him to fit out three ships in 1576. As he passed Greenwich, Queen

Elizabeth 'commended them, and bade them farewell, with shaking her hand at them out of the window.' On the 11th of July he discovered Freeseland. On the 11th of August he entered the strait now known by his name, and stopped at various islands. At Burcher's Island they lost a boat and five men, through the treachery of the natives. He returned to Harwich on the 2nd of October, bringing with him, in token of possession, a piece of black stone like sea-coal, which was supposed to contain gold. A second expedition was fitted out, consisting of a queen's ship and two barks. They sailed May 31st, 1577. On the 19th of July they reached Hall's Island, in Frobisher's Strait. They returned to England in September. Commissioners were then appointed to report upon the whole affair, whose decision was most favourable. Three ships were prepared to seek the passage, whilst twelve others were to proceed to the island for ore. Frobisher, now lieutenant-general, again departed from Harwich, on May 27th, 1578. Ore was duly collected; but the season was unfavourable for discovery. He returned to England in October.

In 1585 Frobisher accompanied Drake in his expedition to the West Indies. In 1588 he so distinguished himself against the Spanish Armada, that he was knighted on board his own ship by the lord-high-admiral. Two years later he commanded a squadron on the Spanish coast. In 1594 he was sent to Brittany, in aid of Henry IV. of France, when, in an assault on the fort of Croyzon, near Brest, he was wounded in the hip, on the 7th of November, and died at Plymouth, after safely bringing back his fleet.

FRODSHAM. [Cheshire.]

FROGS, FROG-TRIBE. According to some zoologists, the *Amphibia* [Amphibia] constitute by themselves a class of cold-blooded *Vertebrata*, but according to others an order of the class *Reptilia*. We incline to the latter view. This order is divided into two primary groups, namely, the *Caducibranchiate Amphibia*, as the Frog; and the *Perennibranchiate Amphibia*, as the Proteus. These groups are again subdivided. The *Caducibranchiate*, with which only we have any concern at present, embraces three distinct families, the *Cœcliadæ*, or snake-like *Cœcilias*, the *Ranidæ*, or Frogs and Toads, and the *Salamandridæ*, or Newts, Tritons, &c.

The *Ranidæ* are by some naturalists called *Anoura* or *Anura*, and sometimes, but not happily, *Anurous Batrachians*, inasmuch as the latter term needs not the preceding adjective, these creatures, as we all know, being when adult tail-less. In these animals the form of the body is broad, short, and depressed; the limbs are four, of which the hinder are far longer and more muscular than the anterior; the head is flat and broad, the gape wide; the cerebral cavity small, and yet the brain scarcely fills it. In one group, the Pipas (*Les Phrynaglosses* of Duméril), the tongue is wanting. In the ordinary frog, the vertebræ are ten in number, in the Pipa eight; both are destitute of ribs; the pelvic portion is greatly elongated. The sternum is highly developed, and a large portion of it is often cartilaginous: it receives the two clavicles and the coracoid bones which support the scapulæ.

Skeleton of Common Frog.

In the true frogs (*Phanéroglosses raniformes* of Duméril) there are small teeth in the upper jaw, and in many even palatine teeth exist, or rather pointed processes, forming a part of the bones to which they are attached, as is found to be the case in certain fishes. In the toads, however, the jaws are destitute of teeth.

The food of these reptiles consists of slugs, insects, aquatic larvæ, and probably the eggs of fluviatile mollusks, and fishes, the soft-shelled of the former, and the fry of the latter. The Pipa tenanting the marshes of Guiana and Brazil most probably snaps at its prey. In the frog and toad the tongue performs a leading part in the appropriation of their living food. This organ, which is soft and fleshy, and lubricated with a glutinous saliva, does not rest upon any thing analogous to the *oshïyoides*, but is fixed to the inner part of the front of the lower jaw, so that when in repose its base is anterior, and its apex points towards the gullet, just the reverse of the ordinary position. When the animal darts it forth at its prey, it becomes considerably elongated, and turns on the pivot of its anterior fixture, being reversed in such a manner, that the surface which was undermost when the tongue was lying in a state of repose in the mouth is, during this action of darting forth, the uppermost; and the original position is gained instantaneously, when, laden with its tiny victim, it turns on its pivot again into the mouth, delivering its load into the pharynx. The rapidity with which this organ is launched forth at insects or slugs is very extraordinary; the eye can scarcely follow the movement; the aim is never missed; the prey, being touched by the tongue, adheres to it by means of the viscid saliva, which is very tenacious, and is shot back into the pharynx.

Like the caducibranchiate Amphibia generally, the young commence their existence as tadpoles, with branchiæ for aquatic respiration, without limbs, but with a fish-like tail or paddle for aquatic progression. As weeks progress, lungs develop

themselves, the branchiæ disappear, withered and useless, the limbs bud forth, and the tail is gradually absorbed till not a vestige remains. The tadpole becomes transformed into a frog. It breathes the air, and seeks the land, still abiding near waters and marshes. (Bell's 'British Reptiles.') We need not say that the skin in frogs is naked; but it is a curious fact, that this delicate covering cooperates with the lungs, affording an extensive surface for the aëration of the blood in the minute capillary vessels. This cutaneous respiration can only take place, as various experiments tend to prove, while the skin is bedewed with moisture; hence the abundant secretion of fluid for the purpose of preserving its necessary degree of humidity; for, as we have observed, in hot weather, even when the frog has no access to water, its skin is still wet; and, as was first ascertained by Townson, a peculiar sac, erroneously regarded as the bladder, serves as a reservoir of pure fluid for the supply of the system with the moisture necessary to the continuance of the vital operations. The skin not only exhales but also absorbs water. According to Townson, the frog often absorbs a weight of water equal to that of its own body in a very short time, and only by the skin of the abdominal surface. It is easy to see how the moist earth will afford this essential of existence, so that the exhalation and absorption may balance each other. Reptiles in general utter indistinct, inharmonious, or hissing sounds. The voice of frogs generally, as is well known (and the male is the most clamorous), consists of a deep guttural croak, though some, as the common frog, as we have heard with pain, when seized by a snake, are capable of uttering a shrill cry of distress. A frog once uttered this cry as we held it in our hand. The croaking noise is produced by the air being driven from the glottis into the puffed-out cavity of the mouth, or into certain guttural sacculi, which in the males of many species, and particularly of the tree-frogs, are very large. Frogs can croak under water, and this fact was not unobserved by the ancients.—Ovid says,

'Quamvis sint sub aquâ, sub aquâ maledicere tentant,
Vox quoque jam rauca est, inflataque colla tumescunt.'
Met. lib. vi. Fol. 6.

The French have some admirable words for the description of sounds. Duméril, speaking of these reptiles, says, 'La plupart coassent, mais ce coassement est très différent dans les diverses espèces des grenouilles; les unes beuglent, aboient, grognent, ou rincannent; d'autres sifflent, piaulent, ou pipent. Certains crapauds produisent les sons flûtes de divers instrumens à vent.'

With respect to the senses, the following remarks may be made:—

Touch.—The naked skin and its sensibility to variations of temperature would seem to indicate a considerable degree of perception as to the physical and even chemical nature of the bodies with which it comes in contact. But touch, properly so called, can hardly exist in a high state of development in the greater part of the anurous Batrachians. They have, indeed, no nails on their toes, which are much longer in the frogs than in the toads; and in many of the genera and species the toes are terminated by fleshy appendages, as in *Pipa*, which has also an elongated fleshy muzzle; the tree frogs also (*Hyla*) have the extremities of their toes dilated into fleshy disks, which, like the acetabula of the *Sepiadæ*, adhere by their circumference. These enable the animals to walk in all directions upon flat surfaces, and to adhere to them even when they are of the smoothest nature. The sense of touch is probably more highly developed where this organisation is manifested.

Taste.—Probably not at all acute. The tongue, as we have seen, is an organ for the capture of the prey, which is swallowed entire almost in the same moment that it is taken.

Smell.—This sense would seem to be almost rudimentary in the Batrachians. A simple opening pierced from the end of the muzzle to the front of the palate, with a fleshy and concave membrane at its external extremity, moving in unison with the respiratory action, is strongly contrasted with the intricate and beautiful structure of the nasal organs, which are so highly developed in the carnivorous mammalia and birds.

Hearing.—There is a considerable difference in the structure of the organ of hearing among the anurous Batrachians. The *Pipas*, for instance, have a sort of small valve upon the tympanum, somewhat similar to that possessed by the crocodiles, and probably intended to protect the membrane against the pressure of the water when the animal resorts to great depths. *Hyla* and *Rana* have the tympanum distinctly manifested by the delicacy of its structure when compared with the other integuments of the head. In the toads the tympanum is not apparent. The reader will find a good example of the organ of hearing in a preparation (No. 1575), in the Museum of the College of Surgeons. It is the head of a bull-frog (*Rana pipiens*, Linn.), showing the free and wide external communication, or 'meatus' of the organ, and the thin semi-transparent vibratile membrane, or drum of the ear, which is stretched across the entrance of the meatus, and is adapted to respond to the impulse of sound conveyed through air. The cavity of the tympanum is laid open on the left side from below, showing the long slender bone (*columella*, or *ossiculum auditus*) which forms the medium of communication between the membrana tympani and the labyrinth, or internal ear. The wide vertical passage, or Eustachian Tube, by which the cavity of the tympanum communicates with the fauces, is also laid open on the left side, but is seen entire on the right. This communication preserves the equilibrium between the air in the cavity of the tympanum and the atmosphere without, and an equable pressure is consequently sustained by the membrana tympani under every barometrical variation. 'It may be observed,' continues the learned author of the Catalogue, 'that the extent and freedom of the Eustachian passage are in relation to the size and exposed condition of the tympanic membrane, and perhaps also to its form, which is convex externally, and therefore the more liable to be affected by undue pressure from without, being only supported behind at a small part of its super-

ficies.' (*Cat. Gallery Physiol. Series*, vol. iii. part 1.)

Sight.—The precision with which a toad measures the distance of an insect, and captures it with its tongue the moment the victim is within reach of that organ, shows a high and accurate development of the organs of sight, as applicable to short distances at least. The pupil is, in general, round, but in the anurous Batrachians, whose habits are nocturnal (the toad, for instance) it is angular or linear. The humours vary in their proportions in the different genera, but the crystalline humour has been noticed of greater density and of a more spherical figure in the aquatic species. The orbits are generally incomplete, and sometimes protected, as in *Ceratophrys*, by folds of thickened cuticle. In the anurous Batrachians there are lachrymal glands, and the *tunica conjunctiva* is so pierced as to permit the tears to run into the cavity of the mouth.

Particular Excretions.—The alleged venom of the common toad, so long a subject of popular belief, had been rejected by many modern naturalists, among whom Cuvier may be particularly mentioned. Dr. Davy however found the venomous matter to be contained in follicles, chiefly in the true skin and about the head and shoulders, but also distributed generally over the body and on the extremities. Pressure causes this fluid to exude or even spirt out to a considerable distance, and a sufficient quantity may be thus collected for examination. Dr. Davy found it extremely acrid when applied to the tongue, resembling the extract of aconite in this respect; and it even acts upon the hands. With a small residuum it is soluble in water and in alcohol; acetate of lead and corrosive sublimate do not affect the solutions. It remains acrid on solution in ammonia, and, when dissolved in nitric acid, it imparts a purple colour to it. Combined with potash or soda, it becomes less acrid, apparently in consequence of partial decomposition. It is highly inflammable as left by evaporation of its aqueous or alcoholic solutions; and the residuum which appears to give it consistence seems to be albumen. More acrid than the poison of the most venomous serpents, it produces no ill effect when introduced into the circulation. A chicken inoculated with it was not affected. Dr. Davy conjectures that this 'sweltered venom' is a defence to the toad from carnivorous animals; and we have seen a dog, when urged to attack one, after some hesitation, drop the animal from its mouth in a manner that left no doubt that he had felt the effects of this excretion, which Dr. Davy thinks may be auxiliary in decarbonizing the blood.

The toads are also said to possess, besides, two glandular masses (parotids), which, when pressed, exude through small holes a yellowish thick humour of a musky odour. The other odours also which many species of toads produce (it does not seem yet ascertained from what source) are very remarkable. Roesel, author of the beautiful work on Frogs, compares some of these to the smell of garlick or of volatilised sulphur of arsenic, or even ignited gunpowder; others again, he says, produce an effect on the nose like the vapour of horse-radish, mustard, or the leaves of monk's-hood rubbed between the fingers. In one instance only he states it to be probable that this emanation comes from the cloaca; and such seems to be the opinion of M. Duméril, who states that he has been assured that, in certain instances, the water in which some of these animals had been placed, and there purposely irritated or excited, had become so acrid that the tadpoles of frogs and salamanders introduced therein hardly survived the immersion.

Geographical Distribution and Habits.—Warm and temperate but moist climates are the localities most favourable to the anurous Batrachians. Extreme cold is fatal to them, and so is extreme dry heat. They are unable to sustain violent and sudden changes of temperature. In moderately warm climates, and those where there is a considerable degree of cold during a part of the year, they bury themselves in winter, either under the earth or in the mud at the bottom of the water, and there pass the season of hybernation without taking food or air, till the spring calls them forth, when the same frog, which had passed so many months without respiration, would expire in a few minutes if prevented from shutting its mouth and so supplying itself with air by deglutition.

For an elucidation of the histories of toads buried for ages, as conjectured, in stone, or in the heart of giant trees, see Dr. Buckland in 'Zool. Journal,' vol. v. His experiments prove that under utter deprivation of air and food the toad soon perishes. As for the pretended showers of frogs and toads, the reader will find an interesting paper on the subject in 'Nouvelles Suites à Buffon—Erpétologie Générale,' vol. viii. p. 223, by MM. Duméril et Bibron. To this admirable work we refer for all details as to the arrangement of genera and the definition of species.

FROISSART, JEAN, was born at Valenciennes about the year 1337. He was the son, as is conjectured from a passage in his poems, of Thomas Froissart, a herald-painter, no inconsiderable profession in the days of chivalry. He was brought up for the church, received a learned education, and became an ecclesiastic. At the age of twenty, at the command of his 'dear lord and master, Sir Robert of Namur, lord of Beaufort,' he began to write the history of the French wars. The period from 1326 to 1356 was chiefly filled up from the chronicles of Jean le Bel, canon of Liège, a confidant of John of Hainault, and celebrated by Froissart for his diligence and accuracy. The remainder up to the year 1400 was the result of his own observation and knowledge, derived in great part from his actual presence in or near the scenes he describes. The value of such a book from a man of such ability, in reproducing what he saw, is of course very great. He came to England in the train of Philippa of Hainault, the admirable wife of Edward III., and acted as her secretary. He then visited the Scotch mountains, and was most honourably received at the Scotch court, and at the castle of Dalkeith by the great Earl of Douglas. In 1366 he was at Bordeaux, at the time of the birth of the Black Prince's son, afterwards King Richard II. In 1368 he was present at the magnificent

feast given by the Count of Savoy to the Duke of Clarence, on his marriage with the daughter of the Duke of Milan. He suffered much in 1369 by the loss of his patroness, the Queen Philippa. Having obtained the living of Lestines, Froissart returned for a time to his own country; but he was soon wandering again, and became secretary to the Duke of Brabant, whose songs, &c., with some of his own, Froissart collected into a kind of romance, called 'Meliador.' The duke dying in 1384, Frossart obtained another patron, the Count of Blois, and was sent by him to the court of Gaston de Foix, purposely to enrich his history. Froissart's narrative of this visit is one of the most interesting things in literature. On his return to Flanders he was robbed of all his money. In 1395 he was again in England, and in the court of Richard II., from whom he received a silver goblet, containing a hundred roubles, and whose fate formed the tragical subject of Froissart's last labour for his history. He died at Chimay, where a benefice had been given him. The exact date of his death is unknown. The best English translation of Froissart's Chronicle is that by Lord Berners, 1525–6, reprinted in 1812. Some splendidly illuminated manuscript copies, quite or nearly contemporary, are in the British Museum.

FROME. [Somersetshire.]

FROND, a botanical term intended to express such organs as are composed of a stem and a leaf combined. The leaves of ferns and palms were thought to be of this nature; but, as it is now known that the leaves of such plants are in no important respect different from those of other plants, the term frond has ceased to have any precise meaning, and is generally disused.

FRONDE, from *Frondeurs*, censurers or jeerers, the name of a political faction in France during the minority of Louis XIV., which was hostile to the prime minister, Cardinal Mazarin, and to the queen regent, who supported him. In consequence of a quarrel with the Parliament of Paris, on the subject of some taxes, the cardinal ordered the arrest of the president and of a councillor, in August 1648, when a civil war broke out. Among the leaders of the Fronde were the dukes of Beaufort, Némours, and Vendôme, Marshal Turenne, &c.; and they were supported by the Parisians, who drew chains across the streets, and obliged the queen to liberate the two members. This was called 'the day of the barricades.' In January 1649, the queen regent and the young king removed to St. Germain, and left Paris to be blockaded by the Prince of Condé. Mazarin was outlawed by the parliament. After some fighting a truce was made, and the king returned to Paris. In the provinces the disturbance continued. In 1650 the queen regent made her peace with some of the Frondeur leaders, and arrested the Princes Condé and Conti, when Marshal Turenne, and others raised a new and more serious revolt, which continued till 1653, when Turenne negotiated, and Mazarin returned in triumph.

FRONTIGNAN. [He'rault.]

FRONTI'NUS, SEXTUS JULIUS, was prætor of Rome, A.D. 70, and about five years later was sent by Vespasian to Britain, where he conquered the Silures. (Tacitus, 'Agricola,' 17.) About A.D. 78 he was succeeded by Agricola in the command of the troops in Britain. He wrote, under the reign of Domitian, his work 'Strategematica,' in four books, in which he gives short anecdotes of numerous Greek and Roman generals, illustrative of the practice of war. Nerva intrusted him with the superintendence of the supply of water to Rome, and while filling this office, which he retained under Trajan, he wrote his work on the aqueducts, which has been printed in the earlier editions under the title of 'De Aquis quæ in Urbem influunt,' but is now generally known by the title 'De Aquæductibus.' It contains much valuable information on the mode in which ancient Rome was supplied with water, and on everything that concerned this important part of the economy of that city. Frontinus died under Trajan about A.D. 106. The other works which are attributed to him are probably spurious. There is an edition of all the works attributed to him, by R. Keuchenius, Amsterdam, 1661, 8vo.

FRONTISPIECE, the front or principal face of a building; the front-view; anything seen in or at the front. Johnson says, 'id quod in fronte conspicitur.' Hence, by a figure, we call the engraved title of a book or the print which faces the title-page a frontispiece.

FRONTO, MARCUS CORNELIUS, born at Cirta in Africa, of an Italian family, came to Rome in the reign of Hadrian, and acquired great reputation as a rhetorician and grammarian. Antoninus Pius appointed him preceptor to his two adopted sons, Marcus Aurelius and Lucius Verus. Fronto obtained the dignity of the consulship. He died in the reign of Marcus Aurelius, at an advanced age. The letters of Fronto were discovered by A. Mai in the present century, and published at Rome, 1823, 8vo. This collection contains letters between Fronto and M. Aurelius, and also some other letters, and is a valuable addition to the literary history of the age of the Antonines. Two or three short epistles of Antoninus Pius are interesting. There are also letters of Fronto to various friends, a few of which are in Greek. The work was translated into French, and published with the text and notes, 2 vols. 8vo., Paris, 1830.

FROSINONE. [Campagna di Roma.]

FROST. [Freezing.]

FROZEN OCEAN, a term used to indicate the seas surrounding the Poles, in which great masses of ice swim about. It is consequently synonymous with *Icy Sea*, and in some degree also with what are called the Arctic and Antarctic Seas or Oceans.

FRUIT, in botanical language, signifies that part of a plant in which the seed is lodged, whatever its size, colour, or texture may be, so that the seed-like grain of a sage, the grain of corn, the nut of a chestnut, the dry capsule of a lilac bush, are as much fruits as those of a peach, an apple, or a pine-apple. In the ordinary acceptation of the term however the word fruit is exclusively applied to seed cases which are eatable, and generally to such as require no preparation to render them fit for food.

The species of cultivated fruits are far from numerous, and most of those of the temperate regions have been introduced, at one period or another, into Britain. The genera from which these have sprung are comparatively few, and chiefly included in the natural orders *Rosaceæ*, *Vitaceæ*, *Urticaceæ*, and *Grossulaceæ*.

Apples are the most numerous class in cultivation. It has been conjectured that they were brought to this country by the Romans; but it is doubtful whether the varieties then introduced would succeed in this climate. A hardier breed, it is more than probable, was introduced by the Normans, especially of such as were suited for the manufacture of cider.

Apples are usually divided into three principal sorts, according as they are fitted for dessert, for kitchen use, or for cider.

Of the varieties of *Pears*, few, till lately, have originated in this country. Most of the kinds in former cultivation were from France, but they generally required the protection of walls. The greater intercourse with the continent, consequent upon the establishment of peace in 1815, led to the introduction of a number of new and hardy varieties of this fruit from Belgium, where its cultivation and improvement had been, and still are, attended to with great assiduity. These new varieties, with some of equal merit, and even superior hardiness, raised within the last few years at Downton Castle, in Herefordshire, now compose the principal part of the most select lists, and are at the same time rapidly excluding the old French varieties from cultivation.

Pears are divided into three classes: dessert, kitchen, and perry.

Cherries, it is said, were first cultivated in this country at Sittingbourn, in Kent, where they are supposed to have been introduced about the time of Henry VIII. That county is still famous for a sort called the Kentish cherry, identical with some of the varieties of the Montmorency cherries of the French. They are round, bright red, and acid, and much used for pies. They have also the peculiar property of the stalk adhering so firmly to the stone, that the latter may be drawn out without breaking the skin, excepting at the base. The fruit is then dried in hair sieves in the sun, or otherwise placed in a gently heated oven. The cherries will then keep for a year, and have the appearance of raisins.

Apricots in cultivation are of few varieties compared with any of the preceding kinds of fruits. The apricot blossoms earlier than any other fruit-tree cultivated in this country; hence, most probably, it was called *Pira præcocia* among the Romans, a corruption of which name is traceable in the modern one of apricot. In consequence of the tree blossoming so early, its blossoms, particularly in the case of young trees, are extremely liable to drop off in setting. This is not to be wondered at, when it is considered that the ground is frequently at the time (March) in as cold a state as at any period of the whole season, neither the sun's heat nor the warm rains having reached so far below the surface as to warm the soil in contact with the roots and thus, whilst the latter are in a medium perhaps a little above freezing, the tops, exposed to a bright sun against a wall, are at that period of the season occasionally in a temperature as high as 90° or 100° Fahr. The injurious effects of this disparity must be sufficiently obvious to every one, and the only remedy to be adopted is to have a very complete drainage below the roots, and the whole soil of the border, not retentive, but of a pervious nature. If it could also be kept perfectly dry previous to the commencement of vegetation, and then only allowed to receive the rain when warm, avoiding the cooling effects of melting snow and hail, the tree would thus be placed under circumstances comparatively more natural.

Peaches and *Nectarines* require the aid of a wall to bring them to perfection in this climate; and in the more northern counties of Britain the protection of glass is also requisite. They likewise rank among the kinds of fruits which are considered of sufficient value to be forced.

The best variety of *Quinces* is the common one. The Portugal Quince is distinct; but its fruit does not ripen so well in this climate as the common quince. Its wood however swells more in conformity with that of the pear, and it therefore is preferable as a stock for pears.

The principal varieties of the *Medlar* are the Large or Dutch, the Upright or Nottingham, and the Stoneless. The first is esteemed for its size, and sometimes for the form of the tree, on account of the rustic crooked appearance which it assumes. The second is of better quality as regards flavour; and the third is small, without stones or seeds, and keeps longer than the others.

Raspberries, compared with many of the fruits mentioned above, differ little in their character as cultivated varieties from that of the botanical species *Rubus idæus*, from which they have arisen: for instance, the difference between the wild sloe and the green-gage is very great; whereas the wild raspberry growing in the woods differs only slightly in flavour, and not widely in size and form, from those cultivated in gardens.

Strawberries are now considerably reduced in regard to the number of varieties in cultivation. By the introduction of 'Keen's Seedling,' the very coarse sorts have been mostly banished even from the streets of London, this variety having proved the best of all for the market, combining very good flavour with the properties of being of a large size and very prolific.

Grapes are brought to high perfection in this country, by the aid of hot-houses. In favourable situations some kinds ripen pretty well, even on walls, in good seasons: but open vineyard culture is not practised to any extent in England at the present time, nor is it likely ever to become profitable. Varieties of wine grapes therefore need not be noticed here, farther than by stating that they are very numerous.

In some parts of England the *Fig* bears in the open air; but, in order to insure its doing so, a warm, or, more strictly speaking, a dry subsoil is absolutely necessary, whether it be grown as a standard in the open ground or against a wall, or forced under glass. Wherever the soil is re-

tentive of water, it will retain the coldness of winter till late in the spring. In fact, if the subsoil be very wet, its temperature will approximate to that of spring water, which in England is little above 50° Fahr. throughout the whole year; an amount of cold which the roots of the fig are certainly not accustomed to in summer in its native climate in Asia and Barbary, or even where it has been naturalised in the south of Europe. Or, if the springs should fall so low during summer as to leave the roots of the fig-tree unaffected by their presence, the temperature of the surface will be suddenly raised by the first rain that falls. This often takes place towards the end of summer, and a superabundant growth ensues, too late for being completed before winter. Figs succeed well in Sussex, where the subsoil is chalk, and the rain passes of as it falls; and, in preparing borders for it, the whole should be composed of such materials as are pervious to water.

Gooseberries are brought to greater perfection in Britain than in any other country. The varieties are numerous, and many of them have been raised in Lancashire, chiefly by the manufacturing population, with a view to prizes.

FRUITS, PRESERVATION OF. The apple and pear, the two staple fruits of this country, are of so much importance to great numbers of persons, that we shall not dismiss this subject without giving some information concerning the best means of preserving them during the autumn and winter; for it is an object of no little moment to be able to prolong the duration of the season of these fruits even for a single month.

A few early varieties may be eaten from the tree, or when recently gathered; but the greater and by far the most valuable portion require to be kept for some time until they acquire a proper degree of mellowness. Thus, most pears are extremely hard when gathered; some even remain so during the winter, and only become melting, or of a buttery consistency, in the spring. Apples, although it is their property to remain a long time nearly as crisp as when gathered, yet are at first too acid for the dessert, and require to be stored up in the same manner as pears, until their juices acquire a rich sugary flavour. Many varieties indeed permanently retain their acidity, but such are only proper for culinary purposes, for which indeed their briskness renders them eligible.

With regard to the gathering and storing of apples or pears, having in view their most perfect preservation, it is necessary that the gathering should be performed in all cases when the trees and fruit are perfectly dry.

The treatment of the fruit after gathering is by no means uniform; some lay it directly on the shelves of the fruit-room, or wherever else it is intended to remain till fit for use; others cause it to undergo a process of fermentation, called sweating, by throwing it in a heap, and covering it with some dry substance, generally straw; in some instances even blankets have been used for this purpose. After it has perspired for ten days or a fortnight, it is spread out at a time when the air is dry, in order to expedite the evaporation of the moisture. All unsound specimens, or even such as are suspected of being so, are then separated. In the case of particularly valuable sorts, it has been recommended to wipe off the moisture with flannel; but this proceeding is not advisable.

The modes of storing the fruit are so very varied according to the circumstances of the individual, that we can only enumerate some of the most successful.

They are deposited in close drawers, on dry shelves, in casks, jars, or boxes plunged in dry sand; in heaps covered with straw, in close cellars excluded from the air, which is a very bad plan, or, as the American apples are very frequently packed, in powdered charcoal, which has a tendency to prevent decay. It is found that fruit keeps best when not exposed to the light, but in situations where ventilation can be secured. A large airy dry vault therefore, or a fruit-room on the north side of a wall where the sun's heat will not easily penetrate, is, we think, the most desirable store-house for a large quantity of such fruit as pears and apples.

Apples and pears dried in ovens may be preserved for years. Bosc states that he has tried the latter, after three years' preservation, and found them still good; but they are best during the first year. They are placed in the oven after the bread is drawn. The process is repeated a second, third, or fourth time, according as the size or nature of the fruit may require. The heat must not be so great as to scorch, nor must the fruit be dried to hardness. When properly done, they are kept in a dry place. Another method, chiefly practised on the Rousselets, and of these the Rousselet de Rheims is the best for the purpose, is to gather the fruit a little before maturity. After being half boiled in a small quantity of water, they are peeled and drained. They are then placed in the oven, and heated to a suitable degree, for twelve hours. They are then steeped in syrup, to which have been added brandy, cinnamon, and cloves. They are again returned to the oven, which is heated to a less degree than at first: this operation is thrice repeated.

The flattened dried apples, called *Beaufins*, so abundant in the London shops, are prepared in Norfolk, from a variety of apple called the Norfolk Beaufin: it has a thick skin, which resists, without bursting, the heavy pressure to which the apples are subjected in the oven, during the slow and lengthened process of drying.

With regard to nuts and walnuts, the only precaution that is necessary to take for their preservation is to maintain the air in which they are placed in a constant state of moisture. Burying in the earth, placing in a damp cellar, mixing with damp sand, and many other such plans have been recommended; but they are all objectionable, either because they keep the fruit too moist, or do not offer any impediment to its becoming mouldy. We believe the best of all plans is to pack them in glazed earthen jars, throwing a small quantity of salt on the last layer before the jar is closed.

FRUSTUM, a portion cut off from any solid

figure. The term is most frequently applied in the case of the cone, and conoidal surfaces of revolution. By 'frustum of a cone' is meant any part cut off from a cone which does not contain the vertex. This distinction is drawn because any part of a cone which contains the vertex is another cone.

FUCHSIA, a genus of plants belonging to the natural order *Onagraceæ*. This genus was named after Fuchs, one of the earliest of modern cultivators of botany.

F. microphylla, Small-Leaved Fuchsia, is a native of the volcanic mountain Jorullo in Mexico. It has a scarlet calyx, with deep-red petals, and blossoms from June to September. It was first described by Humboldt, Bonpland, and Kunth, in their work on American plants, and was first introduced into England in 1828. It is now one one of the most commonly cultivated of the species in the gardens of Great Britain.

F. coccinea, Scarlet Fuchsia, is a native of Chili, in marshy districts, and is found as far south as the Straits of Magalhaens. It is one of the species earliest introduced into the gardens of Great Britain, and was first described by Aiton, in the 'Hortus Kewensis.' It has a scarlet calyx, with violaceous petals. In its native countries the wood is used for obtaining a black colouring matter, and the leaves and young branches are used as medicine. It grows and blossoms in the open air in summer, but requires protection in the winter.

F. corymbiflora, Corymbose Fuchsia, is a native of Peru about Chincao and Muna, in shady groves. It has scarlet flowers 2 inches long, which hang down in beautiful corymbs. The berries are ovate-oblong, of a reddish purple colour. This plant, although described by Ruiz and Pavon, has only been recently introduced into our gardens, and is now justly considered the most ornamental species of this beautiful genus.

F. arborescens, Arborescent Fuchsia, is a native of Mexico, and has been introduced into this country since 1824. It is a larger plant than most of the species, not unfrequently attaining a height of 15 feet.

F. gracilis, Slender Fuchsia, was first described by Lindley, and has been grown in this country since 1823. The flowers have a scarlet calyx and purple petals.

About fifty species of Fuchsia have been described, and many more than those named above have been introduced into the gardens of Europe. They are all American plants.

FUCINUS. [Abruzzo.]

FUCOI'DES, the vague title for many fossil marine plants, given by Brongniart. They are mostly referred to other genera by later writers. There is a peculiar geological interest in the distribution of Fucoids, since Dr. Forschhammer ('Reports to the British Association, 1844') has shown the probability of their influence in the metamorphism of rocks.

FUCUS. [Sea-Weeas.]

FUE'GO, TIERRA DEL, is the name by which the Archipelago is designated which constitutes the southern extremity of America. It is not known for what reason the Spaniards, who discovered it, gave it the name of Fire-Land, but it is supposed that they observed some volcanic eruption on it. Tierra del Fuego lies between 52° 30′ and 56° S. lat., and between 65° and 76° W. long. The whole length exceeds 400 miles; and the greatest breadth, between 68° and 70° W. long., is not less than 250 miles.

Tierra del Fuego consists of one large island, four others of moderate extent, and a great number of smaller islands and rocks. The larger island forms the eastern and north-eastern portion of the group, and occupies considerably more than one-half of the whole. It is called King Charles's Southland; the chief among the others are Navarin, Hoste Island, Clarence Island, and South Desolation. The portions of sea which separate these islands are Beagle Channel, Ponsonby Sound, Magdalen Sound, Cockburn Sound, and Barbara Channel.

The northern portion of King Charles's Southland is a plain, on which is a scanty growth of shrubs and grasses; but the remainder of that island, and all the other islands, are very rugged and mountainous, presenting summits from 3000 to 6000 feet in height. The natives differ considerably from their neighbours, the Patagonians: they are low in stature, varying from 4 ft. 10 in. to 5 ft. 6 in. in height, and live in a very barbarous condition; they have frequently no other covering than a scrap of hide, which is tied to their waists. Their colour is darker than that of copper, and like mahogany or rusty iron.

The climate of this Archipelago is extremely cold and rigorous. The natural productions are nearly unknown. Captain King found parrots and humming-birds on the shores of the Strait of Magalhaens. The natives of the mountainous portion live on fish, which seem to abound in the inlets. The extensive forests do not appear to contain trees fit for timber.

(Capt. P. King, in *Lond. Geogr. Jour.*, vol. i.; Capt. Fitzroy, in ditto, vol. vi.; and Capt. Basil Hall's *Journal*.)

FUEL is any combustible matter employed for the purpose of creating and maintaining heat. In the early ages of the world, *wood* must have constituted, as indeed in many countries it does to this day, the principal fuel employed. *Charcoal*, another kind of fuel, is merely wood that has undergone imperfect combustion, so as to expel its hydrogen and oxygen, and to leave the greater part of the carbon. *Peat*, or *turf*, which is a congeries of vegetable matter, in which the remains of organisation are more or less visible, is used in many countries as fuel. In this country *coal* furnishes the great supply of fuel. *Coke* bears nearly the same relation to coal that charcoal does to wood. In the east, dried camel's dung is often used for fuel. Composts, or artificial fuel, are often made by combining different combustible substances.

FUENTE-RABIA. [Basque Provinces.]

FUERTEVENTURA. [Canaries.]

FÜGER, FRIEDRICH HEINRICH, a distinguished German painter, was born at Heilbronn

in Würtemberg, in 1751. He studied first in the academy at Dresden, whence he went in 1774 to that of Vienna, where he obtained the privilege of being sent as imperial pensioner to Rome. In 1782 he visited Naples, and painted a series of frescoes for Queen Caroline at Caserta. In 1784 Füger was appointed professor in and vice-director of the academy at Vienna, and subsequently director. He died at Vienna in 1818. Füger distinguished himself in fresco, oil, and miniature painting, and likewise etched several plates with skill. His style of design was however too academic. Some of his best works have been engraved by J. P. Pichler.

FUGGER, a German family, originally of Augsburg, that amassed great wealth in the fifteenth and sixteenth centuries by commerce. The Fuggers were created counts by Charles V. in 1530, to whom they had lent large sums of money, and, it is said, lighted a fire of cinnamon-wood with the securities on the occasion of a visit from him. They also supplied Philip II. with money, and contracted for the quicksilver mines of Almaden, in Spain. The family became divided into branches, one of which obtained the rank of princes of the German empire, under the title of Fugger Babenhausen, near Ulm. The family still exists, and their domains are partly in Bavaria and partly in Würtemberg. The Fugger family, in the sixteenth century, made a liberal use of their wealth, in founding charitable institutions, such as the one still called Fuggerei, in Augsburg, in promoting learning, collecting MSS., and forming valuable libraries. Several members of the family were themselves men of learning and literature.

FUGUE, in Music, a composition in which a subject, or brief air, passes alternately from one part to another, according to certain rules of harmony and modulation. There are several varieties: the Strict Fugue, the Free Fugue, the Double Fugue, the Inverted Fugue, and Imitation. 'In a *Strict Fugue*,' says Dr. Crotch ('Elements of Composition'), 'the subject is given out by one of the parts, then the answer is made by another; and afterwards the subject is repeated by a third part, and, if the fugue consist of four parts, the answer is again made by the fourth part: after which the composer may use either the subject or the answer, or small portions of them, in any key he pleases, or even on different notes of the key. The chorus 'He trusted in God,' in the 'Messiah,' is a fine specimen of this sort of fugue. In the *Free Fugue* much more latitude is allowed the composer; he is not so restrained by the subject, but may introduce passages not closely related to the theme, though they should never be very foreign to it. The overture to the 'Zauberflöte' affords a splendid example of this species. The *Double Fugue* consists of two or more subjects, moving together, and dispersed among the different parts. Scarlatti's fugue in D minor is a double fugue. In the *Inverted Fugue* the theme is inverted, as the name indicates. *Imitation* is a species of fugue, in which the theme is more or less imitated in the different parts; it may be made in any of the intervals, and, in fact, is governed by scarcely any rule. There are also the *Fugue by Augmentation*, in which the notes of the answer are doubled in length; and the *Fugue by Diminution*, in which they are halved in length. The *Canon* is a sort of perpetual fugue. [CANON.]

FULCRUM. [LEVER.]

FULDA, a province of the electorate of Hesse-Cassel, between 50° and 51° N. lat. and 9° and 10° E. long., is bounded on the N.E. by Saxe-Weimar, on the E. and S.E. by Bavaria, and on the W. by Hesse-Darmstadt. Its area is about 880 square miles, and its population about 130,000. Fulda was formerly a bishopric; it was made a principality by the Prince of Nassau Orange in 1803, was incorporated by Napoleon with the grand-duchy of Frankfort in 1810, and in 1815, after being ceded to Prussia, was immediately afterwards made over to Hesse-Cassel. The country is intersected by branches of the Rhön and Vogel ranges, and watered by the Fulda, Kinzig, Werra, Haune, and other rivers. It produces corn, flax, potatoes, timber, cattle, brown coal, potter's clay, and salt.

The province is divided into the circles of Hersfeld, Schmalkalden, Hünfeld, and Fulda, and contains five towns, seven market villages, and 198 other villages. Besides Fulda, the chief town, the principal towns are Hersfeld, Geiss, Schmalkalden, Steinbach, Hünfeld, and Brotterode.

FULDA, the capital of the province, is about 60 miles N.E. from Frankfort on the Main, in 50° 34′ N. lat., and 9° 44′ E. long. It is built on the banks of the Fulda, which is crossed by a handsome stone bridge. Fulda is a pretty town, with eight suburbs outside its walls. The walls, which are decayed, have seven gates. Its population is about 10,000. It contains a market-place, 2 squares, an electoral palace and grounds, a cathedral, 11 churches, a Roman Catholic lyceum, a Protestant high-school, a chapter seminary, a school in which forest economy is taught, and another for educating teachers, an hospital, public library, &c. The manufactures are on a confined scale, and consist of linens, woollens, stockings, saltpetre, leather, articles in wood, &c.

FULGE'NTIUS, FABIUS CLAUDIUS GORDIANUS, bishop of Ruspina, a town on the coast of Africa, was born about A.D. 464. He is said to have made great progress in his studies, and to have acquired an accurate knowledge of the Greek and Latin languages. He was appointed at an early age to receive the public revenues of the province; but he resigned his office soon after his appointment, and retired to a monastery. After enduring many persecutions on account of his opposition to the Arian doctrines, he went to Rome, A.D. 500. On his return to his native country, the Catholic clergy elected him bishop of Ruspina; but he was soon exiled to Sardinia by Thrasimond, king of the Vandals. The fame of his learning and of his character led Thrasimond to recall him to Carthage, where he held disputes with the king on the debated points of the Arian controversy; but, as he was unable to convince the monarch, he was obliged to return to Sardinia, where he remained till A.D. 522, when the death of Thrasimond and the succession of Hildericus to the throne occasioned the recall of the Catholic

bishops. Fulgentius returned to Ruspina, and resided there till his death, A.D. 529 or 533.

His works were printed at Paris, in a 4to. volume, in 1684. He knew well the Holy Scriptures and had read much the works of the fathers, particularly those of St. Austin. The following are some of his chief works: — Three Books to Thrasimond, king of the Vandals, on the Arian Controversy; Three Books to Monimus; a Book on the Trinity; three Books on Predestination; and a Book on Faith.

(Dupin's *Bibliothèque Ecclésiastique*, vol. v. p. 13–21; Eng. Trans.; *Acta Sanctorum*, vol. i., Januar., p. 32.)

FULGENTIUS, FABIUS PLANCIADES, is said to have been a bishop of Carthage, and to have lived in the 6th century. He wrote a work on Mythology, in three books, addressed to a priest of the name of Catus, which was printed for the first time at Milan, in 1487. There is another work of Fulgentius, entitled 'Expositio Sermonum Antiquorum ad Chalcidicum Grammaticum,' which is usually printed with the works of Nonius Marcellus. (Fabricii *Bibliotheca Latina*, lib. ii. c. 2.)

FULGORA, a genus of hemipterous insects, popularly known as Lantern-Flies, on account of their power of emitting light in the dark. The *Fulgora laternaria* of Linnæus is the type. It is a native of South America. The form of this insect is very remarkable, on account of the irregular inflated and enormous head, out of which the phosphorescence is said to proceed. Many travellers deny altogether the luminosity of the Lantern-Fly, whilst others as strongly assert it. It is probably a sexual peculiarity, and only exhibited at certain periods in the animal's life.

FULGURITES are vitrified sand-tubes, supposed to have originated from the action of lightning: they are called by the Germans *blitzröhre*. They have been met with in Silesia, in East Prussia, in Saxony, and in many parts of England.

These tubes are nearly all hollow, and vary in diameter from a fraction of an inch to 2 or 3 inches. They occur in sand heaps, sometimes vertically, and sometimes inclined. Their entire length, judging from those which have been extracted, is from 20 to 30 feet; but frequent transverse fissures divide them into portions from half an inch to five inches in length. Usually there is only one tube found at a place; sometimes however there are several. The internal part of the tubes is a perfect glass, smooth, very brilliant, and exceedingly hard. All the tubes are surrounded by a crust composed of agglutinated grains of quartz, which have the appearance of having undergone incipient fusion. The colour depends on the nature of the surrounding soil. All the evidence goes to show that they are produced by the action of lightning on the silicious particles of sand.

FULHAM. [MIDDLESEX.]

FULIGULINÆ, a sub-family of the *Anatidæ* [DUCKS], containing the Diving Ducks, which feed principally on shell-fish (*mollusca*), to which marine and river vegetables are also added. The prince of Musignano (C. L. Bonaparte) arranged under the sub-genus *Fuligula* those species of the ducks which other modern ornithologists have distinguished by the generic titles of *Somateria*, *Oidemia*, *Fuligula*, *Clangula*, and *Harelda*. The prince observes, that M. Temminck, who had been opposed to all dismemberment of the great genus *Anas*, had at last been induced to assemble all the species of the prince's sub-genus *Fuligula* under one genus; whence the prince argues the necessity of M. Temminck's admitting the Swans and Geese as distinct genera; and he observes that he cannot see any good reason why M. Temminck should have rejected the name of *Fuligula*, as well as *Platypus*, given anteriorly to the genus by Brehm, and should have imposed on it the name of *Hydrobates*, a term already applied by Vieillot to the genus *Cinclus*. ('Specchio Comparativo.')

Mr. Swainson ('Fauna Boreali-Americana') adopts the term *Fuligulinæ* to distinguish this sub-family, under which he arranges the genera *Somateria*, *Oidemia*, *Fuligula*, *Clangula*, and *Harelda*.

Habits, Food, &c.—The *Fuligulinæ*, or *Sea Ducks*, as they have been not inaptly named, frequent the sea principally; but many of them are to be found in the fresh-water lakes and rivers where the water is deep. The plumage is very close and thick in comparison with that of the true ducks (*Anatinæ*), and the covering of the female differs much in hue from that of the male, which when adult undergoes but little change in its dress from the difference of season. The young resemble the female in their feathered garb, and do not assume the adult plumage till the second or third year. Moulting takes place twice a year withour change of colour. In the male, the capsule of the trachea is large.

The Sea Ducks are not good walkers, on account of the backward position of their feet, but they run, or rather shuffle along rapidly, though awkwardly. They swim remarkably well, though low in the water, and excel in diving, whether for amusement, safety, or food, which last consists of insects, mollusks, the fry of fish, and marine or other aquatic vegetables. They take wing unwillingly as a security from danger, relying more confidently on their powers of diving and swimming as the means of escape than on those of flight. Though they are often strong, steady, rapid, and enduring in their passage through the air, they generally fly low, laboriously, and with a whistling sound.

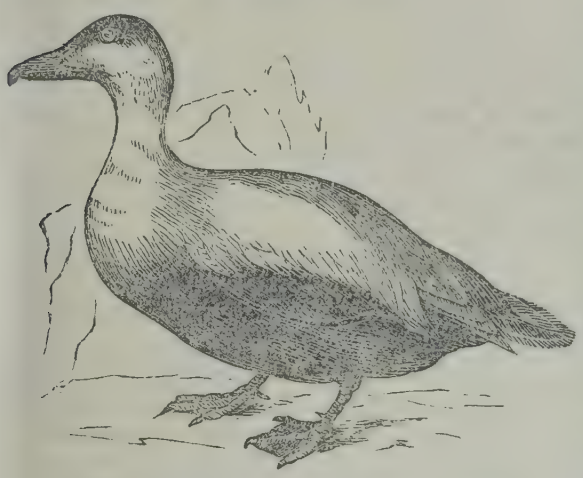
This sub-family may be considered to be monogamous, and the nest is frequently made near the fresh water; the female alone incubating, though both parents, in several of the species at least, strip the down from their breasts as a covering for the eggs, which are numerous.

Geographical Distribution.—The north may be considered the great hive of the *Fuligulinæ*; though some of the forms are spread over the greater part of the globe. Large flocks are seen to migrate periodically, keeping for the most part the line of the sea-coast, and flying and feeding generally by night, though often, especially in hazy or blowing weather, by day.

Genus *Somateria* (Leach).—Bill small, with the

base elevated and extending up the forehead, where a central pointed line of feathers divides it; the anterior extremity narrow but blunt; nostrils, mesial; neck, thick; wings, short; tertiaries, long; and generally with an outward curve, so as to overlie the primaries. Tail moderate, consisting of fourteen feathers.

Example.—The Eider Duck (*Somateria mollissima; Anas mollissima*, Linn.). This is the *Oie à Duvet ou Eider* of the French; *Die Eidergans* and *Eiterente* of the Germans; *Oca Settentrionale* of the Italians; the *Eider Goose* and *Eider Duck* of the modern British.



Eider Duck (*Somateria mollissima*). Male.

Eider Duck (*Somateria mollissima*). Female.

This bird and indeed others of the same genus are peculiarly marine. Dr. Richardson, whose opportunities of observing the northern birds were so great, and so well used, says, that *Somateria spectabilis* and *S. mollissima* are never, as he believes, seen in fresh water, their food consisting mostly of the soft mollusca in the Arctic Sea. They are, he says, only partially migratory, the older birds seldom moving farther southwards in winter than to permanent open water. He states that some Eider Ducks pass that season on the coast of New Jersey, but that the King Ducks (*S. spectabilis*) have not been seen to the southward of the 59th parallel. Audubon however says, that in the depth of winter the latter have been observed off the coast of Halifax, in Nova Scotia, and Newfoundland, and that a few have been obtained off Boston, and at Eastport in Maine.

The genus is remarkable for the high development of the exquisitely soft and elastic down so valuable in commerce, and so essential to the keeping up of the proper balance of animal heat in the icy regions inhabited by these birds. The icy seas of the north appear to be the principal localities of this species. Major Sabine enumerates it among the animals which were met with during the period in which the expedition under Captain Parry remained within the Arctic circle. He mentions it as abundant on the shores of Davis's Straits and Baffin's Bay; but adds, that, deriving its food principally from the sea, it was not met with after the entrance of the ships into the Polar Ocean, where so little open water is found. The females were without the bands on the wings described by authors. (Appendix to Capt. Sir W. E. Parry's First Voyage, 1819–20.) Captain Lyon saw the Eider Duck in Duke of York's Bay. Captain James Ross noticed vast numbers of the King Duck resorting annually to the shores and islands of the Arctic regions in the breeding season, and as having on many occasions afforded a valuable and salutary supply of fresh provision to the crews of the vessels employed in those seas. Speaking of the Eider Duck, he says, it is so similar in its habits to the King Duck, that the same remarks apply equally to both. In Lapland, Norway, Iceland, Greenland, and at Spitzbergen, the Eider Duck is very abundant; and it abounds also at Behring's Island, the Kuriles, the Hebrides, and Orkneys. In Sweden and Denmark it is said to be more rare, and in Germany to be only observed as a passenger. Temminck states that the young only are seen on the coasts of the ocean, and that the old ones never show themselves. Captain Ross, speaking of the eider down, says that the down of the King Duck is equally excellent, and is collected in great quantities by the inhabitants of the Danish colonies in Greenland, forming a valuable source of revenue to Denmark. A vast quantity of this down, he adds, is also collected on the coast of Norway, and in some parts of Sweden. The Eider Duck is found throughout Arctic America, and is said to wander, in severe winters, as far south to sea as the Capes of the Delaware. From November to the middle of February, small numbers of old birds are usually seen towards the extremities of Massachusetts Bay, and along the coast of Maine. A few pairs have been known to breed on some rocky islands beyond Portland, and M. Audubon found several nesting on the island of Grand Manan in the Bay of Fundy. The Prince of Musignano notes it as rare and adventitious in the winter at Philadelphia. The most southern breeding place in Europe is said to be the Fern or Farn Isles, on the coast of Northumberland.

Genus *Oidemia*.—Bill broad, with dilated margins, and coarse lamelliform teeth, gibbous above the nostrils, which are nearly mesial, large and elevated. Tail, of fourteen feathers.

The *Oidemiæ* seek their food at sea principally, and have obtained the name of *Surf Ducks*, from frequenting its edge. The prevailing colour of the tribe is black in the male, and brown in the female. The plumage is very thick and close; and,

according to Audubon, the down in the Velvet Duck (*Oidemia fusca*) is similar to that of the Eider Duck, and apparently of equal quality. Their flesh is high-flavoured and oily, according to Dr. Richardson, who gives that character to the flesh of three species, viz. *Oidemia perspicillata*, *O. fusca*, and *O. nigra*.

Example.—*Oidemia perspicillata*, *Anas perspicillata* of Linnæus, the *Black Duck* or *Surf Duck*.

Genus *Fuligula* (Ray).—Bill flat, broad, long, with hardly any gibbosity at the base, and rather dilated at the extremity. Nostrils suboval, basal. Tail short, of 14 feathers, graduated laterally. First quill longest.

The sea and its bays and estuaries are the principal haunts of this genus. Dr. Richardson states that *Fuligula Valisneria*, *F. ferina*, *F. marila*, and *F. rufitorques*, breed in all parts of the Fur Countries, from the 50th parallel to their most northern limits, and associate much on the water with the *Anatinæ*. *Fuligula rubida*, he remarks, frequents the small lakes of the interior up to the 58th parallel, and he adds that it is very unwilling to take wing, and dives remarkably well. In swimming, according to the same observer, it carries its tail erect, and, from the shortness of its neck, nearly as high as its head, which, at a little distance, causes it to appear as if it had two heads.

The Canvass-Back Duck, *Fuligula Valisneria*, *Anas Valisneria* of Wilson, may be selected as an illustration of the genus. The Canvass-Backs associate with the Pochards, and are waited upon by the Bald-Pates, or wigeons (*Mareca Americana*). They are named in different parts of the Union White Backs and Sheldrakes, as well as Canvass-Backs. *Zostera marina* and *Ruppia maritima* form their food, as well as the fresh-water *Valisneria*, which last is limited in its distribution. The Sea-Wracks or Eel-Grass, as the long marine vegetables above alluded to are called in America, are widely spread over the Atlantic, and over the mud-flats, bays, and inlets where salt or brackish water finds access. The Canvass-Backs dive for and generally pluck up the sea-wrack, and feed only on the most tender portion near the root. They are very shy birds, and most difficult to be approached. Various stratagems are resorted to for getting within gunshot of them; and in severe winters artificial openings are made in the ice, to which the ducks crowd and fall a sacrifice to their eagerness to obtain food. That they will eat seeds and grain as well as sea-wrack, &c., was proved by the loss of a vessel loaded with wheat near the entrance of Great Egg Harbour, New Jersey, to which great flocks of Canvass-Backs were attracted. Upon this occasion as many as 240 were killed in one day. (Wilson; Nuttall.)

The Canvass-Back, which is lean on its first arrival in the United States, becomes, in November, about three pounds in weight, and in high order for the table: there are few birds which grace the board better. The Prince of Musignano is eloquent in its praise: 'Carne della massima squisitezza, grandemente ricercata dai gastronomi. La migliore delle Anitre. Forse il miglior uccello d'America.' Any attempt to introduce the bird into England would, it is feared, prove a failure; for, even if the ordinary difficulties should be got over, the absence of the food to which it is supposed to owe its exquisite flavour would render the success of the experiment very doubtful.

Genus *Clangula* (Boié).—Bill narrow, elevated at the base, somewhat attenuated at the anterior extremity, and short. Nostrils inclining to oval, submesial, or rather anterior to the middle of the bill. Tail rather long, of 16 feathers generally.

Though many of this genus frequent the sea, the species are more generally met with in the fresh waters than the other Sea Ducks. Thus Dr. Richardson remarks that *Clangula vulgaris* (Common Golden Eye) and *C. albeola* (Spirit Duck) frequent the rivers and fresh-water lakes throughout the Fur Countries in great numbers. They are, as he states, by no means shy, allowing a near approach to the sportsman; but at the flash of a gun, or even at the twang of a bow, they dive so suddenly that they are seldom killed. Hence the natives impute supernatural powers to them, as the appellations of Conjuring Ducks and Spirit Ducks sufficiently testify. Dr. Richardson says that the manners of *Clangula Barrovii* (Richardson and Swainson), described in 'Fauna Boreali-Americana,' and which has hitherto been found only in the valleys of the Rocky Mountains, do not differ from those of the Common Golden Eye. He speaks of *Clangula histrionica* as haunting eddies under cascades and rapid streams, as very vigilant, taking wing at once when disturbed, as rare, and as never associating, as far as he saw, with any other bird. The high northern latitudes may be considered generally as the localities of this genus.

Genus *Harelda* (Leach).—Bill very short, high at the base, nail broad and arched. Laminæ prominent, trenchant, and distant; the upper laminæ projecting below the margin of the mandible, the lower laminæ divided into a nearly equal double series. Nostrils oblong, large, and nearly basal. Forehead high; neck rather thick. Tail very long, of fourteen feathers; toes short.

Example.—*Harelda glacialis*, *Anas glacialis*, Linn., the *Long-Tailed Duck*.

Geographical Distribution.—The Arctic seas of both worlds. An accidental visitor on the great lakes of Germany, and along the Baltic. Often, but never in flocks, on the maritime coasts of Holland. (Temminck.) Abundant in Sweden, Lapland, and Russia. (Gould.) Noted in the list of birds seen within the Arctic Circle and as breeding in the North Georgian Islands, but not common there. ('Supplement to Appendix to Captain Parry's First Voyage.') Females taken in Duke of York's Bay. (Captain Lyon's 'Journal.') Abundant in the Arctic Sea, associating with the *Oidemiæ*, remaining in the north as long as it can find open water, and assembling in very large flocks before migrating. Halts, during its progress southwards, both on the shores of Hudson's Bay and in the inland lakes, and is one of the last of the birds of passage which quits the Fur Countries. Captain James Ross describes it as the most noisy and most numerous of the ducks

that visit the shores of Boothia. ('Appendix to Captain Sir John Ross's Last Voyage.') The species is abundant in Greenland, Lapland, Russia, and Kamtchatka, and flocks pass the winter (from October to April) at the Orkney Islands. They are seldom seen in the southern parts of England, unless the weather be very severe. In October they visit the United States, and abound in Chesapeake Bay.

In addition to the genera above mentioned, *Gymnura* (*Oxyura* of Bonaparte), *Macropus*, and *Micropterus* find a place among the *Sea Ducks*.

The species from which the genus *Oxyura* is established is bred in the north, according to Nuttall ('Manual'), and principally haunts fresh-water lakes, diving and swimming with great ease, but it is averse to rising into the air. It is small, and is said, by the last-named author, to be nearly allied to *Anas leucocephala*, which inhabits the saline lakes and inland seas of Siberia, Russia, and the east of Europe, and also to have an affinity with *A. Jamaicensis* of Latham. Nuttall thinks that it is perhaps identical with *A. spinosa* of Guiana, if not also with *A. Dominica* of Gmelin, a native of St. Domingo, and probably only resident there during the winter. He also observes that, the name of *Oxyura* having been previously employed for a sub-genus of Creepers, it was necessary to alter it; but the student should remember that *Gymnura* had been preoccupied by Sir Stamford Raffles for a genus of mammifers; and that Spix has named a family of South American monkeys *Gymnuri*. The Prince of Musignano however corrected himself, and changed the name to *Erismatura*. Mr. Gould gave the name of *Undina* to the genus, and figures the European species under the name of *Undina leucocephala*.

It should be remembered that the sub-generic term *Macropus* has been long applied as a generic name for the Kangaroos.

Micropterus is the genus containing the well-known *Race-Horse* of Cook (*Micropterus brachypterus*, *Anas brachyptera* of authors). Captain Phillip Parker King, R.N., who has added a second species (*Micropterus Patachonicus*), gives these short-winged but rapidly progressing Sea Ducks the familiar name of Steamer Ducks or Steamers.

At a meeting of the Zoological Society, in December 1837, Mr. T. C. Eyton made some observations on the *Anatidæ*, which family he regarded as connected with the *Grallatorial Birds* by means of the *Flamingo* on the one side and the *Semipalmated Goose* on the other, with the *Divers* of the family *Alcadæ* by the *Mergansers*, and also with the *Cormorants* through the *Erismaturinæ*. Mr. Eyton divides the *Anatidæ* into the sub-families *Plectropterinæ*, *Anserinæ*, *Anatinæ*, *Fuligulinæ*, *Erismaturinæ*, and *Merginæ*.

FULLER, THOMAS, was the son of the Rev. Thomas Fuller, rector of Aldwincle, in Northamptonshire, where he was born in 1608. He was educated under his father, and was sent at an early age to Queen's College, Cambridge. He became B.A. in 1625, and M.A. in 1628, but afterwards removed to Sidney College, where he obtained a fellowship in 1631. About the same time he obtained a prebend in Salisbury Cathedral, and the rectory of Broad Windsor in Dorsetshire, on his entering into orders. In 1639 he published his 'History of the Holy War.' Having removed to London, he soon became popular, and was invited to the lectureship of the Savoy. He was a member of the convocation in Henry VIIth's chapel in 1640. When the civil war broke out, he favoured the cause of the king, and even preached at Westminster Abbey, in March 1642, a sermon that placed him in some danger from the opposition. He refused to take an oath to the parliament in 1643, and joined the king at Oxford, who was very desirous to hear him. By a sequestration he lost all his books and manuscripts, which was however partly made up by his friends. In 1643 he joined the army as chaplain to Sir Ralph Hopton, and then began to collect materials for his chief work, the 'Worthies of England.' In the spring of 1644, he was at Basing-House, when it was attacked by Sir W. Waller, and he animated the garrison to so vigorous a defence that the parliamentarians were compelled to retreat with great loss. Subsequently he took up his residence at Exeter, and was there appointed chaplain to the infant princess, Henrietta Maria. When Exeter surrendered to the parliament in April 1646, he returned to London. His old lectureship was filled, but he was chosen lecturer of St. Clement's, near Lombard Street; but he appears to have been forbidden to preach. The following year he was presented to the rectory of Waltham Abbey by the Earl of Carlisle. His first important book, the 'Church History of Britain,' &c., was published in 1655. Before the Restoration he was readmitted to the lectureship of the Savoy, and to the prebend in Salisbury Cathedral. After that event he became chaplain extraordinary to the king, and was created D.D. at Cambridge. He died on the 15th of August, 1661. His 'Worthies' was published after his death. Fuller was the author of a great number of works of lesser importance than those named. He was a man of great wit, and of almost incredible memory.

FULLER, REV. ANDREW, was born February 6, 1754, at the village of Wicken, in Cambridgeshire. In 1770 he became a member of the baptist church at Soham, where he began to preach occasionally at a very early age, and for which, in 1775, he was regularly ordained pastor. In 1782 he removed to a Baptist church at Kettering, in Northamptonshire. He died on the 7th of May, 1815. Fuller took an active part in the formation, in 1792, of the Baptist Missionary Society, of which he was the secretary until his death, and the interests of which he promoted with untiring zeal in the face of much opposition. His theological works are numerous and highly prized, though many of them are small, and relate to controversial subjects, often of temporary interest. A second edition of his complete works appeared in 1845. His life, by Dr. Ryland, was published in 1816. The college of New Jersey, in America, gave him the degree of D.D.: he did not, however, use it.

FULLERS' EARTH, a mineral product, for-

merly much used in the fulling of cloth. It occurs massive, and is usually of a greenish brown or dull gray colour; sometimes it is nearly of a slate colour. It occurs in many parts of England, between beds of sand or sandstone. Dr. Thomson considers it to be a compound of silica 2, alumina 1, water 2, and a few accidental silicates.

FULMINIC ACID is that which exists in Detonating Mercury and Silver. It is supposed to be isomeric with cyanic acid, that is, to consist of C^2, N^1, O^1. Fulminic acid may be separated from the oxides of silver and of mercury, and combined with other bases, as with potash, and it still retains its power of forming detonating compounds.

FULTON, ROBERT, the first to establish steam-navigation on the American seas and rivers, was born in 1765, in Pennsylvania. His parents were emigrants from Ireland. In 1786 he embarked for England, and lived for some time by painting; but his taste leaned towards mechanical pursuits. He spent about two years in Devonshire, where he became acquainted with the Duke of Bridgewater, and projects for the improvement of canals then began to occupy the chief share of his attention. In 1794 he took out a patent for an inclined plane, which was intended to set aside the use of locks; he invented a machine to facilitate excavation, and wrote a work on canals, in which he first styled himself a civil engineer. He also invented a mill for sawing marble, and took out patents for spinning flax and making ropes. These projects failed to enrich him; and he went to Paris, where he studied languages, invented a sub-marine boat, projected a panorama, and made experiments in the Seine with small steam-boats. After trying in vain to introduce his sub-marine boat into England, he went to America in 1806, and soon afterwards commenced the construction of a steam-vessel of considerable size, which began to navigate the Hudson in 1807. He afterwards built others of large dimensions, one of them a frigate, which bore his name. His reputation became established; but lawsuits in reference to certain patents kept him poor, and anxiety and excessive application shortened his days. He died in 1815, in his 49th year. His death occasioned extraordinary demonstrations of national mourning in the United States. In person he was tall, and, though slender, well formed. He appears to have been an amiable, social, and liberal man.

FUMA'RIA, a genus of plants, the type of the natural order *Fumariaceæ*. There are about twelve species of Fumaria, which are smooth slender herbs. *F. capreolata*, Rampant Fumitory, is a climbing plant, and has cream-coloured flowers tipped with red or purple. *F. officinalis*, Common Fumitory, grows in corn-fields and cultivated land throughout the world, and is plentiful in Britain. The flowers are of a pale red colour, deep red at the summit, with a green keel to the upper and under petals. The leaves are succulent, saline, and bitter, and the expressed juice is recommended as a remedy in cases of hypochondriasis and cachectic states of the body. It is said to correct acidity and strengthen the stomach. Boerhaave used to prescribe it in black jaundice and bilious affections. It has also gained some reputation as a cosmetic. Dr. Cullen recommends an infusion of the leaves in cutaneous disorders, and he also advises the use of it as a tonic whenever bitter remedies are desirable. *F. micrantha* is found both in England and Scotland, and has pale purple flowers in dense spikes. *F. parviflora* resembles *F. officinalis*, but is smaller in all its parts. The flowers are of a pale red colour. It is found in Kent, and is also very common in the East Indies, where it is used as a medicine. *F. Vaillantii* is a British species, and is also found in sandy fields in the neighbourhood of Paris and Montpelier.

FUMARIA'CEÆ, a small natural order of exogenous plants, consisting of slender-stemmed herbaceous plants, many of which scramble up others by means of their twisting leafstalks. They are rather succulent in texture, with watery juice. *Fumaria officinalis* is one of the commonest of weeds; many are objects of cultivation by the gardener for the sake of their showy flowers; all are reputed diaphoretics. They only inhabit the cooler parts of the world, alike avoiding the extremes of heat and cold.

FUMARIC ACID, an acid obtained from fumitory. It is in the form of small white crystalline laminæ, which dissolve in about 200 parts of cold water, but are readily dissolved by hot water, and by alcohol. Hydrated fumaric acid consists of C^4HO^3+HO, and is consequently isomeric with aconitic acid.

FUMAY. [Ardennes.]

FUMIGATION is the application of the vapour or fumes from metallic or other preparations to the body, with the intention of healing either generally or particular parts. The vapours of hot vinegar, burning sulphur, and of aromatic vegetable matters have been long used to counteract unpleasant or unwholesome smells: this is effected chiefly by the formation of such as are stronger. The most important kind of fumigation is that which consists in the employment of such vapours or gases as do not merely destroy unhealthy odours by exciting such as are more powerful, but which by their chemical action prevent the decomposition of animal and vegetable matters.

The fumigation of the first kind, that which is intended to produce a healing effect, is now much less employed than formerly. The use of vinegar, of aromatic pastilles, and even the smoke of burning brown paper, which constitute the second kind of fumigation, do not require any particular notice; their operation can hardly be regarded as any other than that of substituting one smell for another. In the last kind of fumigation several substances have been employed in the gaseous state; such as the vapour of burning sulphur, or sulphurous acid gas, muriatic acid gas, nitric acid gas, and chlorine gas.

Chlorine gas, which is undoubtedly preferable to any disinfectant, was first recommended by Dr. Rollo, the gas being liberated by the usual method of mixing sulphuric acid, binoxide of manganese, and common salt. When it is desirable to produce a great effect in a short time, this is still unquestionably the best mode of proceeding.

Where unpleasant smells or effluvia are pro-

duced only in small quantities, the chloride of lime or soda, and especially of the former, has been within a few years successfully employed. The chloride of lime is a substance well known and extensively employed under the name of Bleaching Powder.

The chloride of lime is used in solution, and is obtained by dissolving one part of Bleaching Powder in about 100 times its weight of water, and allowing the solution to become clear. This is to be exposed to infected air, or, in rooms which have any unpleasant odour, in flat vessels, in order that a sufficient surface may be acted upon. If it should be required, the operation may be quickened by the addition of a little vinegar, or of muriatic acid largely diluted. In some cases, where the disagreeable smell is extremely strong, and where it would be difficult to expose a solution to slow action, it may be thrown into the place, or the powder may be used, the action of which would be more gradual and effectual. Chloride of soda is prepared only in solution; the process is given in the last edition of the 'London Pharmacopœia;' it is however less easily obtained than the chloride of lime, is more expensive, and not in any respect preferable; the solution is then called Liquor Sodæ Chlorinatæ.

FUMITORY. [Fumaria.]

FUNA'RIA, a genus of plants belonging to the natural order *Musci*, or Mosses. There are three British species of this moss: *F. hygrometrica*, *F. muhlenbergii*, and *F. hibernica*.

F. hygrometrica is a native of Great Britain, and is found by way-sides and under hedges, especially on spots where a wood-fire has been burning on the ground. It may be thus constantly found on the sites of gipsies' encampments. It has obtained its specific name *hygrometrica* from its fruit-stalk having the property of twisting in different directions when moisture is applied to it. On taking a dry fruit-stalk into the hand and moistening the lower part with the finger, the capsule will turn itself from the right to the left by making two, three, or more turns; on moistening the upper part in the same manner, the capsule turns itself more rapidly in an opposite direction. Under the microscope the stalk exhibits an elongated cellular tissue twisted in a spiral form. The cellular tissue is not however turned uniformly, but at two-thirds of the length of the stalk it commences to assume a straighter form, and at the upper part it again turns itself, but more acutely, in an opposite direction to that of the lower part. The cause of the turning in two different directions depends on this structure of the cellular tissue. The capsule turns itself in an opposite direction to the spires which are moistened; and the circumstance of its turning more rapidly on the upper end being wetted depends on the more acute angle made by the upper spires. The dryness of the fibres is not the cause of this phenomenon, as the green fruit-stalks, although perfectly dried, do not turn when moistened. The movements in this case are probably owing to the shortening of the vegetable fibre by the contact of moisture. In the green stalk the thick fluid contents of the cells leave a precipitate, when they are dried, which fills them up and prevents the action of moisture upon them. In the ripened stalk this precipitate is dissolved and absorbed, and otherwise applied; and thus the cells, being empty, act like hollow tubes.

(Lankester, *On the Structure of Funaria Hygrometrica.*)

FUNCHAL. [Madeira.]

FUNCTIONS, CALCULUS OF. By the term *function of a quantity* is meant any algebraical expression, or other quantity expressed algebraically or not, which depends for its value upon the first. Thus the circumference of a circle is a function of the radius; the expression (a^2-x^2) (b^2+y^2) is a function of a, b, x, and y.

All algebra is, in one sense, a calculus of functions; but the name is peculiarly appropriate, and always given, to that branch of investigation in which the *form* of a function is the thing sought, and not its value in any particular case, nor the conditions under which it may have a particular value. For instance, 'What is that function of x which, being multiplied by the same function of y, shall give the same function of $x+y$?'—is a question of the calculus of functions.

A function of x is denoted by φx, ψx, χx, fx, Fx, Φx, &c., &c., the first letter being a symbol of an operation to be performed. Thus Ffx denotes that, when the operation signified by f has been performed upon x, that signified by F is performed upon the result. When the same operation is repeated, the results may be denoted by $fx, ffx, fffx$, &c., which may be abbreviated into fx, f^2x, f^3x, &c.

FUNCTIONS, THEORY OF, a name given by Lagrange to his View of the Principles of the Differential Calculus. The works of Lagrange, in which its details are to be found, are 'Théorie des Fonctions Analytiques,' first edition, 1797; second edition, 1813; and 'Leçons sur le Calcul des Fonctions,' of which the first edition is volume 10 of the 'Leçons de l'École Normale (1801), and the second was published in 1806.

Taking Lagrange's intention to have been the proof that algebra, as it existed in his time, was sufficient to demonstrate the principles of the Differential Calculus without the introduction of limits, we have only to remark that the end is completely attained. The objections which are generally made against it also lie against the mode of treating series universally admitted in the last century, and are equally valid against both. See a short account of them in the 'Penny Cyclopædia.'

FUNDAMENTAL BASE, in Music, is the lowest note of the Perfect Chord, or Triad, and also of the chord of the 7th: hence it is the root of all real chords. The term is not the best that might have been chosen. The same meaning is much better conveyed by the term *Radical Base*, introduced, we believe, by Dr. Callcott.

FUNDS. [National Debt.]

FUNDY, BAY OF. [Nova Scotia.]

FÜNEN, in Danish *Fyen*, an island in the Baltic, separated by the Little Belt from Schles-

wig and Jutland, and by the Great Belt from the island of Seeland, lies between 55° 2′ and 55° 37′ N. lat., 9° 42′ and 10° 45′ E. long. Its greatest length is 50 miles, and its mean breadth is 33 miles. Its area is about 1190 square miles, and its population is 151,600. The surface is a level, varied by low hills in the southern districts. The north-east of the island is deeply indented with bays extending from the Kattegat, particularly the Odense Fiord. The soil is in general rich and productive. Fünen abounds in small streams, here called *aas*, and lakes; there are also several peat-moors. The climate is damp and variable, but milder than that of Seeland. The principal crops are barley, oats, and buckwheat. Much flax, hemp, and hops are raised. With the exception of potatoes, the cultivation of vegetables is limited; but the orchards are numerous, and an inferior kind of cider is made. Horses, horned cattle, sheep, and swine are numerous. There is a great quantity of wild-fowl and poultry, especially geese. The fisheries are productive. The only minerals are freestone, chalk, and limestone. There are no manufactures of importance.

The exports consist of corn, spirits, apples, horses, oxen, butter, salted meat, tallow, hides, hops, linen, honey, and wax. Odense, which by its canal has a direct access to the sea, is the great trading mart of the island. The only good road is that from Middelfahrt to Odense.

The principal towns are—*Odense*, the capital, which is reputed to be the most ancient town in Denmark. It has 7000 inhabitants, a royal palace, a town-hall, four churches, one of which, that of St. Knud or Canute, erected eight centuries ago, contains the tombs of St. Knud and of several Danish kings, a gymnasium, theatre, two public libraries, hospital, &c. *Assens*, which is on the west coast, at the entrance into the Little Belt, has about 2330 inhabitants. *Bogense*, on the north coast, population 1000. *Kierteminde*, on the Great Belt, population 1600. *Middelfahrt*, which stands on the Little Belt, and has 1300 inhabitants; a ferry about a mile across conducts to Snoghoi on the Jutland coast. *Svendborg*, the chief town of the bailiwick of this name, which is at the south-eastern extremity of Fünen, on the narrow *sund*, or channel, which separates the island from that of Taasing; it has two churches, and 3400 inhabitants, and exports much grain, &c. *Nyeborg*, a fortress on the east coast, which contains the remains of the palace in which the kings of Denmark used to hold their courts and national diets, population 2900. *Faaborg*, in the south-west, which is a small place of about 1500 inhabitants. Fünen, together with the islands of Langeland, Taasing, and the several islets on the south coast, form a province, which is subdivided into two bailiwicks, Odense and Svendborg. The province forms the see of a Lutheran bishop, who resides at Odense.

FUNERAL ORATIONS, discourses at funerals. The second book of Thucydides (c. 35, &c.) contains the harangue delivered by Pericles at the funeral ceremony in honour of those Athenians who fell at the beginning of the Peloponnesian War. It was also a Roman fashion to deliver such harangues. Nero pronounced a funeral oration over his wife Poppæa. Funeral orations were common over Christian martyrs; and funeral sermons are sometimes delivered in English churches.

The practice of delivering what may be properly called funeral orations, that is, addresses by laymen over the grave or at the interment of the dead, is common among the French and is not unfrequent on great occasions among the people of the United States.

FUNERAL SHOWS, or GAMES, frequently followed public funerals among the Greeks and Romans. An early example of this occurs in the funeral games celebrated by Achilles in honour of Patroclus. (Homer, 'Iliad.') The 'Adelphi' of Terence was produced for the first time at the funeral of Lucius Æmilius Paulus.

FÜNFKIRCHEN, *Pecs*, an old town in the county of Baranya in Hungary, and the seat of provincial administration, stands at the foot of Mount Metshek, and at the edge of a rich and extensive valley, in 46° 5′ N. lat., 18° 16′ E. long., and has 11,270 inhabitants. It contains several handsome buildings, an episcopal palace, an ecclesiastical seminary, a gymnasium, a cathedral, said to be the oldest in Hungary; several churches, some of which were formerly Turkish mosques; a public library and cabinet of coins, two hospitals, &c. In the vicinity are coal-mines, alum and vitriol works, and extensive vineyards. Large quantities of corn and tobacco are grown about Fünfkirchen, and much rape-seed is raised for making oil. The trade of the town is chiefly in the produce of the country, and in leather. There are mineral springs and baths. The Turks held this town from 1543 to 1686.

FUNGI. Under this name botanists comprehend not only the various races of mushrooms, toadstools, and similar productions, but a large number of microscopic plants forming the appearances called mouldiness, mildew, smut, rust, brand, dry-rot, &c.

Nothing can well be more different than the extremes of development of Fungi, if the highest and the lowest forms are contrasted; as, for example, the large fleshy *Boleti*, which inhabit the trunks of trees, and the microscopic mould-plants, composed of threads much too delicate to be distinguished by the naked eye. Nevertheless it turns out upon inquiry that the latter is only a simple form of the former, or, in other words, that a *Boletus* is merely an enormous aggregation of the vegetable tissue constituting a Mucor, developed upon the same plan, subject to the same influences, possessing a similar chemical character, and propagating by means which are altogether analogous.

That they are cellular or filamentous may be easily ascertained by examining them with even an indifferent microscope; perhaps they might be even simply described as cellular, for their filamentous tissue seems nothing but cells drawn out. Sometimes, as in the genus *Uredo*, they consist of spheroidal cells, having little connection with each other, each cell containing propagating matter, and

all separating from each other in the form of a fine powder when ripe: the smut in corn is of this nature; or, as in *Cylindrosporium*, the cells are truncated cylinders, not adhering, as far as we can see, and separating in like manner when ripe. In plants of a more advanced organisation, as the genus *Monilia*, the constituent cells are connected in series, which preserve their spherical form, and also contain their own reproductive matter; while in such plants as *Aspergillas* the cells partly combine into threads forming a stem, and partly preserve their spheroidal form for the fructification. From adhering in simple series, the structure of Fungi advances to a combination of such series into strata, whence result the various kinds of dry-rot, thick leathery expansions developing amidst decaying timber; a more complicated form is thence produced in the form of puff-balls, truffles, sclerotiums, and the like, in which a figure approaching that of a sphere is the result, the reproductive cells being indiscriminately confused in the interior of such plants; and, finally, the organisation is so much complicated, that, independently of a mere aggregation of tissue, we find envelopes of various kinds for the protection of the propagating mass, as in *Agaricus* and *Geostrum*, and special receptacles for the propagating matter, as in *Boletus* and numerous others.

It is probable however that in all Fungi, and certain that in most of them, the first development of the plant consists in what we here call a filamentous matter, which radiates from the centre formed by the spore (or seed), and that all the cellular spheroidal appearances are subsequently developed, more especially with a view to the dispersion of the species.

The concentric growth of the filamentous stem or spawn of Fungi may generally be witnessed in damp cellars, when they begin to grow without impediment upon the walls or decaying wood. Nothing is more common in such situations than to see a beautiful white flocculent matter, which a breath almost will dissipate, spreading from a centre nearly equally in all directions; such appearances, formerly called *byssi*, have been ascertained to be the spawn of various kinds of Fungi, the fructification of which is probably never developed.

Unlike other plants, Fungi, instead of purifying the air by robbing it of its carbonic acid and restoring the oxygen, vitiate it by exhaling carbonic acid and absorbing oxygen. This has been proved experimentally by Dr. Marcet of Geneva, and will probably explain the cause of Fungi being so universally destitute of green colouring matter, which we know results from the decomposition of carbonic acid. That they are not equivocally generated is sufficiently proved by each species having its own particular kind of seed or spore; a provision that would be perfectly unnecessary if the species sprang up out of decaying matter by the mere action of particular combinations of external forces. To assert the existence of fortuitous creations in this class of plants is contrary, not only to analogy, but to the plainest evidence.

Fungi are among the most numerous of all plants in regard to genera and species; so abundant, indeed, that no one has as yet attempted to form an estimate of their numbers. Fries somewhere asserts that he had discovered above 2000 within the compass of a square furlong in Sweden. Even the European species of microscopic Fungi are but little known; and, as for those which inhabit the tropics, our knowledge of them amounts to little or nothing. It is generally asserted that they are uncommon in tropical countries; but it is doubtful whether this is true, and at all events it appears from the evidence of a modern traveller in Java that they are extremely abundant there.

They usually prefer damp, dark, unventilated places, such as cellars, vaults, the parts beneath decaying bark, the hollows of trees, the denser parts of woods and forests, or any decaying matter placed in a damp and shaded situation, and are most especially averse to dryness and bright light. Even when they appear upon the live leaves of trees, the stems of corn, or in similar situations, it is either at the damp and wet season of the year, late in the autumn, or in damp and shaded places; and M. Audouin has shown experimentally that when live insects are attacked by them it is only when they are confined in damp, unventilated places. In stations favourable to their multiplication they often commit extensive ravages, attacking and destroying timber, and producing decay in all kinds of vegetable matter of a soft and succulent nature. Nor is it to dead matter that their ravages are confined. They sometimes fix themselves upon live insects, producing great havoc among the silkworms in the manufactories of Italy, and are probably the cause of a more extensive destruction of such animals than we at present have any idea of. Under the name of mildew and blight they commit excessive damage among living plants, as the farmer and orchardist know too well to their cost.

FUNGIC ACID exists partly in a free state in the *Periza nigra*, and combined with potash in the *Boletus juglandis*. It is found in most fungi. It is colourless, very sour, uncrystallizable, and deliquescent. Some doubt exists as to whether it is a distinct acid.

FUNGIN, the fleshy substance of mushrooms, purified by digestion in a hot weak solution of alkali: it is whitish, soft, insipid, and but little elastic. It is a highly nutritious substance, and in many of its properties it strongly resembles lignin.

FUNICULAR MACHINE is a name given by some mechanicians to a cord or chain attached at one extremity to an immoveable point, the other end passing over a fixed pulley or friction wheel, and having a weight suspended from it; a weight being also suspended from the cord or chain in some part of its length between the fixed extremity and the pulley. The cord or chain becomes thus a mechanical agent, since unequal weights, applied as has been said, may be in equilibrio.

A cord suspended in a vertical plane between two fixed points, and acted on by weights placed at different points in its length, is called a funicular polygon; and the form of the suspended cord being given, with the weight to be applied at

one angular point, the weights at all the other angular points, in the case of equilibrium, may be found by the parallelogram of forces. (See Hutton's 'Tracts,' Tract i. s. 2, prop. 1.)

FUNNEL, a hollow conical vessel with a small pipe issuing from its apex, much used in domestic life for conveying fluids into vessels of small apertures, and in chemical operations not only for this purpose but for that of filtering.

FURIES. [EUMENIDES.]

FURLONG. [WEIGHTS AND MEASURES.]

FURNACE. The common grate is the most familiar example of a furnace; and in the smaller chemical operations various contrivances are used, midway in character between a grate and a furnace; but the furnaces usually so called are the following:—

The *Wind Furnace* gives a very high temperature by the aid of a powerful draught. It is from 12 to 15 inches square, and is furnished with moveable bars and a cover. The air is conveyed by pipes directly from without door to the ash-pit, and the chimney is narrow and high. Such a furnace is much employed in the reduction of metals, and in the assaying of copper and various other ores. The fuel used is either coke or a mixture of coke and charcoal.

The *Assay* or *Cupelling Furnace* is a small furnace made of iron, lined with refractory clay, and containing a muffle [MUFFLE]; it is used principally for the cupellation of gold and silver, which is placed upon a cupel in the muffle, previously heated to redness. The interior of the furnace contains merely the muffle resting upon two bars of iron; it is put about two-thirds into the furnace, and there is consequently left a space betwen it and the back part of the furnace. Charcoal is used in this furnace.

For metallurgic operations on a large scale, as well as in making alkalies, red lead, &c., the *Reverberatory Furnace* is much used. There is a space furnished with a grate or bars, to contain the fuel, which is either coal, coke, or wood, according to circumstances. Beyond and behind this is a large low vacant space, so shaped that the flame may reverberate from the brick roof, and strike down upon the substance to be heated, which is placed upon a flat brick surface. There is a very high chimney that produces the draught, and which may be closed by a damper.

The *Smelting Furnace*, for iron work, is a large structure of brick, having a small square receptacle for the fuel beneath, a large interior space for the ore to be melted, a wide-mouthed chimney at the top, and air-holes at the bottom to admit either the hot or cold blast. Some of the South Wales furnaces have an internal cavity of 5000 cubic feet.

FURNES. [FLANDERS, WEST.]

FURRIERY. [FURS AND FUR TRADE.]

FURRUCKABAD, the capital of the district of Furruckabad, in Hindustan, is situated a short distance from the western bank of the Ganges, in 27° 24′ N. lat., and 79° 27′ E. long. Furruckabad is one of the principal towns of Upper Hindustan. It is inclosed by a wall; the streets are wide, and in the best parts of the town the houses are good, but the greater part of the dwellings are mud hovels. The population has been estimated at about 66,000, exclusive of strangers, who, as Furruckabad is an emporium in that part of Hindustan, are always there in considerable numbers.

FURS; FUR TRADE; FUR DRESSING. The use of furs appears to have been introduced into civilised Europe by the northern conquerors.

The fur trade was taken up by the French colonists of Canada; and, through the ignorance of the Indians, the traders at first made very great profits. When the hunting season was over, the Indians came down the Ottawa in their canoes, with the furs, and encamped outside the town of Montreal, where a kind of fair was held until the furs were all exchanged for trinkets, &c. At a later period, European settlers under the name of *Coureurs des Bois*, or wood-rangers, set out at the proper season from Montreal in canoes loaded with various articles, and proceeded up the river to the hunting grounds, where they conducted their traffic with the hunters, and returned with the furs or peltries.

The Hudson's Bay Company, established with the express object of procuring furs, was chartered by Charles II., in 1670. This association founded several establishments. In 1783 a rival association, called the North West Company, was established by some British settlers in Canada; and from that time till 1821 great jealousy and enmity existed between the agents in the two companies. An amalgamation took place in 1821. The clerks, agents, &c., of the united company are very numerous. All the furs collected by the Hudson's Bay Company are shipped to London, some from their factories of York Fort, and on Moose River, in Hudson's Bay; other portions from Montreal, and the remainder from the Columbia River.

The fur-trade is prosecuted in the north-western territories of the United States by an association called the North American Fur Company, the principal managers of which reside in New York. The Company employs steam-boats for ascending the rivers, which penetrate with ease to regions which could formerly be explored only through the most painful exertions in keel-boats and barges, or by small parties on horseback or on foot.

The following are the principal skins taken for the sake of the fur:—The *ermine*, called by way of pre-éminence 'the precious ermine,' is found almost exclusively in the cold regions of Europe and Asia. The fur of the ermine is of a pure whiteness throughout, with the exception of the tip of the tail, which is black; and the spotted appearance of ermine skins, by which they are peculiarly known, is produced by fastening these black tips at intervals on the skins. The *stoat* is an inferior kind of ermine. The *sable* is a native of Northern Europe and Siberia; those of the darkest colour are the most esteemed. *Martens* are found in North America as well as in Northern Asia; the American skins are generally the least valued, but many among them are rich and of a beautiful dark-brown olive colour. The *Fiery Fox*, so called from its brilliant red colour, is taken near the north-eastern coast of Asia, and its fur is much valued, both for its colour and fineness, in

that quarter of the world. *Nutria* skins are chiefly used by hat-manufacturers as a substitute for beaver. *Sea-Otter* fur, of the young animal, is of a beautiful brown colour, but when older the colour becomes jet-black. The fur is exceedingly fine, soft, and close, and bears a silky gloss. *Fur-Seals* are found in great numbers in the colder latitudes of the southern hemisphere. Bears, foxes, beavers, racoons, badgers, minks, lynxes, musk-rats, rabbits, hares, and squirrels are procured in North America.

Furs may be classed as *felted furs* and *dressed furs*. The first includes all such as are employed in hat-making, and are principally the skins of the hare, the rabbit, the beaver, and the neutria.

The mode of preparing beaver fur for the hatter will sufficiently illustrate the treatment of furs generally. The pelt or skin is so greasy, that it requires to be scoured with fuller's earth and whiting before it attains a sufficient state of cleanness. The coarse hairs are pulled out by the knife and thumb, and, being of no use to the hatter, they are sold as a stuffing for cushions. Then comes the cutting or cropping, which is at the present day, and in the largest establishments, effected by a very beautiful machine. There is a long broad and sharp blade, so adjusted as to fall rapidly with a chopping action against or near the edge of another blade beneath. The fur falls down in a light flocculent layer on an endless apron beneath, whence it is removed when the pelt has been shorn.

The term *dressed furs* is given to those furs which are retained on the original pelt, and in that state worn as garments or trimmings, in the forms of cloaks, tippets, cuffs, collars, &c. The fur-hunters, when they have captured a beaver or other fur-bearing animal, strip off the skin, and hang it up to dry, either in the open air or in a dry and cool room. When the skins are brought to England and placed in the hands of the furrier, he examines them minutely, to see that the drying has been properly effected, and the pelt in a firm state. He then washes the skin, to extract all greasiness from the fur, and gives the pelt a sort of slight tanning, or tawing, by means of alum and other ingredients. The skins are then ready to be worked up into materials for garments. In order to give the surface of the fur a uniform length and colour of fibre, it is often necessary to cut up many skins, and sew them edge to edge; for it is rarely if ever the case that every part of the same skin is of one uniform colour.

FÜRSTENBERG, a principality consisting of several mostly isolated districts on the rivers Danube, Wutach, and Kinzig, and scattered through the kingdom of Würtemberg, the grand-duchy of Baden, and the principality of Hohenzollern-Sigmaringen. They have an area of 766 square miles, and a population of 117,679. Besides these possessions several seigniories in Bohemia belong to the principality. The prince's residence is at Donaueschingen, where he has his chancery and public offices; his yearly income is estimated at about 55,000*l.* sterling. Donaueschingen is situated at the confluence of the three streams which form the Danube. It contains about 3100 inhabitants. Another branch of this family has large possessions in Austria, where they have the title of landgrave.

FÜRTH, a town in the circle of Rezat in Bavaria, is situated in a fertile plain at the confluence of the Rednitz and the Pregnitz, about 4 miles N.W. of Nürnberg, to which it is joined by a railroad. It contains about 17,000 inhabitants, many of whom are Jews. There are three churches, one of which is Roman Catholic, and a splendid synagogue. The high church contains one of the oldest and largest organs in Germany. The Jews have a sort of university here called a Talmud School, where their learned men and rabbis are educated. Fürth has also a town-hall, a grammar and a superior civic school, an hospital, a theatre, &c. Independently of a brisk transit trade, Fürth is the residence of a number of small manufacturers, whose productions are looking-glasses, chandeliers, glass, sealing-wax, pocket-books, pencils, needles, spectacles, cabinet-work, turnery, clocks, jewellery, saddles and harness, locks, &c. Some cottons, caps, and stockings are also woven. There is an annual fair at Michaelmas, which lasts fourteen days.

FURZE. [ULEX.]

FUZEE. [HOROLOGY.]

FU'SELI, HENRY, was the second son of John Caspar Fuessli, a portrait and landscape painter, and author of 'Lives of the Helvetic Painters.' He was born at Zürich in Switzerland, 7th of February, 1741. The elder Fuessli gave his son a classical education, and brought him up for the church. He took the degree of M.A. at Caroline College, Zürich, and entered into holy orders in 1761; but having written a pamphlet, in conjunction with Lavater, in which the conduct of an unjust magistrate was exposed, his friends deemed it prudent to oblige him to travel for a while. Having come to England with the view of promoting literary communications between Germany and England, he stayed here, supporting himself for a time by translating for the booksellers from the German, French, and Italian languages into English, and from the English into German. In 1766 he travelled for a short time as the tutor of the eldest son of Earl Waldegrave, but threw up the charge in displeasure. He now saw Reynolds, showed him his drawings, and at once, by Reynolds's advice, devoted himself to art. He was one of the artists engaged by Boydell for his Shakspere Gallery. In 1788 he married Miss Rawlins, of Bath Easton. In 1790 he was elected a member of the Royal Academy, of which, nine years later, he became Professor of Painting, and, in 1803, keeper. Canova, on his visit here, was so struck with Fuseli's works, that he obtained his election at Rome as a member of the first class in the Academy of St. Luke. Boydell's Shakspere Gallery suggested to Fuseli the idea of a similar one for Milton, which he accomplished, and exhibited in 1799, but with no pecuniary advantage. Among his literary works he edited an edition of the works of his young and illustrious friend Lavater, assisted [illegible] his

R.B.A.N.M.S.H.S. M. LIBRARY
Bloc. 42
Accession No. 3155
U.D.C. No.
Date; 4.2.81

translation of Homer, translated into German Lady Mary Montague's Letters, and into English Winkelmann's work on Ancient Painting and Sculpture.

His lectures contain some of the best Fine Art criticism in the language. In painting he made Michel Angelo his chief study. In dreams, or terrible subjects, he is often grand; generally his works are characterised by superfluous energy. He wanted only better self-discipline to have made a truly great painter. As it was, he was a true artist. Many curious stories are told of his satirical wit upon his contemporaries. Fuseli died April 15, 1825, and was buried in the crypt of St. Paul's Cathedral. He had altered his name from Fuessli in order to suit the Italian pronunciation.

FUST, or FAUST, JOHN, an opulent citizen of Mainz, a goldsmith by trade, whose name appears as one of the inventors of the art of printing, in the manner in which that art is effected by moveable metal types. Gutenberg and Schoeffer were the two others. Schoeffer, by inventing the puncheon, is supposed to have given completion to the discovery. It is not however quite certain that Fust did more than supply money to Gutenberg, who had made attempts with moveable metal types at Strasburg, before he removed to Mainz in 1444–1445. Fust entered into partnership with him; but soon after, in consequence of a law-suit, the partnership was dissolved, and the whole of Gutenberg's printing apparatus fell into Fust's hands, who ultimately, with the assistance of Peter Schoeffer, made the invention useful to the world. The Latin Bible in folio, commonly called the Mazarine Bible, executed between 1450 and 1455, if it was not by Gutenberg, is supposed to be the earliest production of their press.

With an exception or two, the whole of Fust and Schoeffer's productions, about sixteen in number, are in the collection at the British Museum.

Fust, whose name appears with Schoeffer's for the last time in 1466, is supposed to have died in that, or at latest in the next year, of the plague, at Paris. Schoeffer continued to print in his own name for a long time.

FUSTIAN, a cotton fabric similar in the mode of manufacture to velvet, having in addition to the warp and weft, common to all woven goods, a *pile* consisting of other threads doubled under the weft, and 'thrown in' at intervals so close together that when the goods are finished the interlacing of the warp and weft are concealed by them. While in the loom, the pile forms a series of loops, which are afterwards cut and sheared; the shearing is effected by very beautiful machinery.

There are different varieties of fustians, known by the names of cotton velvets, velveteens, beaverteens, moleskin, corduroy, and cords. Different patterns are produced by different dispositions of the pile threads.

FUSTIC is the name of two kinds of yellow dye-wood.

Young Fustic is the produce of *Rhus Cotinus*, a native of Italy, France, and Greece. The root and the wood of this shrub are both imported, deprived of their bark, and employed for dyeing a yellow colour approaching to orange, upon wool or cottons.

Old Fustic, the 'bois jaune' of the French, is the produce of *Morus tinctoria*, a native of tropical America and the West India Islands. The wood is yellow, hard, and strong, but easily splintered, and is imported in the form of large logs or blocks. The yellow colour which it affords with an aluminous base, though durable, is not very bright.

In 1846 there were 10,557 tons of Fustic imported into the United Kingdom, of which more than half was from New Granada.

FUTTEHGHUR, a town in the district of Furruckabad, in Hindustan, distant 3 miles from the city of Furruckabad, on the western bank of the Ganges, in 27° 21′ N. lat., and 79° 30′ E. long. Futtehghur was formerly an important military station of the British government, but only a few soldiers and certain civil officers are now stationed there. Several European merchants reside and carry on their business within its walls. During the dry season the Ganges is here reduced to two or three narrow channels winding slowly through a bed of sand, and at this time the town is exceedingly dusty. The town contains an arsenal protected by a strong mud fort.

FUTTIPOOR, a town of Hindustan, situated 19 miles S.W. from the city of Agra, in 26° 6′ N. lat., and 77° 34′ E. long. The walls by which it is surrounded are of great extent. The inclosed space appears for the most part to have been always unprovided with buildings. It was inclosed and fortified by the Emperor Akbar, whose favourite residence it was. It contains an extensive tomb, built by Akbar, in which several members of the imperial family were buried. The palace which he inhabited has long been in ruins.

FUZE, a short tube made of metal or of well seasoned beech, and fixed in the bore of a shell. It is filled with a composition, which is fired by means of a small piece of quick-match inserted for the purpose. The length of a fuze is regulated by the intended range of the shell or by the intended time of its flight.

FYZABAD, a town of Hindustan, in the kingdom of Oude, situated on the south side of the river Goggra, in 26° 47′ N. lat., and 82° 3 E. long., 2 miles west from the city of Oude. In the reign of Shujah ud Dowlah, Fyzabad was made the capital; but the seat of government was transferred to Lucknow, in 1775, by his son and successor Azoph ud Dowlah. Shuja's palace is already in ruins. The population however is still numerous.

G. This letter is from the Latin alphabet. In the Greek alphabet its place is supplied by *zeta*. If, as seems probable, the sound of this Greek letter was the same as the consonantal sound at the beginning of the word *judge* (see Z), it may perhaps be inferred that the hissing sound now given to the letter *g* existed in some dialect of ancient Italy. The sound is familiar to the modern Italian. The sound of the letter *g* in the English language is two-fold. Before *a*, *o*, and *u*, and occasionally before *i* and *e*, it is the medial letter of the guttural order. The other sound, which it has only before *i* and *e*, is one of the medials of the sibilant series, and is also represented by the letter *j* as pronounced by the English. The sibilant sound is written in Italian by two letters *gi*, as Giacomo, Jacob, or by *gg*, as *oggi*, to day. The two-fold nature of the sound corresponds to the double sound of the letter *c*. [See C.]

The guttural *g* is liable to many changes in different dialects or languages.

1. *G* and *k* are convertible. Thus the Greek and Latin forms *genu* γονυ; *gen*, γεν, as in *gen,us*, γεν,ος; *gno*, γνω, as in *gno'sco*, γι,γνω,σκω; severally correspond to the German and English *knie, knee; kind, kin; kenn,en, know.*

2. *G* and an aspirated guttural: as, Greek, χην; German, *gans*; English, *goose* and *gander*. There can be no doubt as to the connexion between the Greek χθες, the Latin *hes-ternus*, and the German *ges-tern*. The close connexion of the two sounds may also be seen in the pronunciation of the final *g* in high German like *ch*, as *Ludwig*, &c.

3. *G* and *h*. As the letter *h*, when pronounced, is only a weak aspirate, this interchange strictly belongs to the last head.

4. *G* often disappears: First, at the beginning of a word, as in the Latin *anser*, a goose, compared with the forms given above, and in the English *enough*, compared with the German *genug*. Many examples of this occur in the now poetical participles of the English language commencing with a *y*. as *yclept, yclad*, &c; also in *ago* for *agone;* in all of which the fuller form began with *ge*, as is still seen in German. The loss of *g* is very common before *l* and *n*, as Eng. *like*, Germ. *gleich;* Lat. *nosco, nascor*, from *gnosco, gnascor*. Secondly, in the middle of words between vowels, as in French words derived from the Latin, as: *legere, lire*, read; *magister, maistre*, master; *Ligeris, Loire*, &c.; also in English words connected with German, as *nagel, nail; segel, sail; regen, rain*, &c. In such cases the vowel is generally lengthened. Lastly, at the end of words, as, *sag-en, say; mag, may; tag, day:* here, again, the syllable is strengthened.

5. *G* and *y* are convertible: as *yester-day*, compared with the Germ. *gestern; yawn* with *gähn,en; yellow* with *gelb*. In our own language we find related words showing this difference: *yard* and *garden;* and *yate*, a dialectic variety of *gate*.

6. *G* with *gu* and *w*. In the Latin language there coexist the forms *tinguo, tingo; unguo, ungo; urgueo, urgeo*, &c. In the French language *gu* is presented to the eye, but *g* to the ear, in the following: *guerre, guêpe, guarder*, &c.; in English we have *war, wasp, ward*, or *guard*. A final *w* in the English language often corresponds to a guttural in other Teutonic dialects, as *saw, raw, crow*, &c.; and we often have two letters, *ow*, where the German has a guttural *g*, as in *follow, sorrow, morrow*.

7. *G* and *b*. This is generally confined to those cases, at the beginning of words, when an *r* or *l* follows, as in the Æolic forms, γλεφαρον, γληχων, γαλανος, in place of βλεφαρον, βληχων, βαλανος.

8. *G* and *d:* as δη-μητης γη-μητης. This change, as in the last case, is common before *l;* hence the Latin *dulcis* by the side of the Greek γλυκυς.

9. The guttural *g* and the sibilant *g*. The hard *g* belongs to Europe, the *j* sound to Asia. Thus *reg*, a king, is in the East *rajah*.

10. The sibilant *g* and *di* or *bi* before a vowel. For examples see D and B.

11. *G* appears to attach itself to the letter *r* at the end of roots: as *mer,go, spar go*, compared respectively with the Latin *mare* and the Greek σπειρω. This outgrowth corresponds to the addition of *d* at the end of roots ending in *n*. [See D.] Thus the two liquids take as an addition the medial consonants of their own order, the dental *n* preferring the dental *d*, while *r* takes to it the guttural *g*.

G, in Music. [Diatonic; Gamut; Scale.]

GABION, a hollow cylinder of wicker-work, resembling a basket, but having no bottom. It is formed by planting slender stakes vertically in the ground, at intervals from each other, on the circumference of a circle, and interweaving with them osiers or other flexible twigs.

The most usual kind of gabion is about 2 feet in diameter, and 2 feet 9 inches in height, but the stakes, whose extremities are pointed, project beyond the basket-work about 3 or 4 inches at each end. Such gabions are used during a siege in executing trenches by the process of sapping.

Gabions of the same kind are sometimes used to form a revetment for the interior of a battery, being then placed on end in two or more horizontal rows, one above the other, and leaning against the mass of earth. Four or five gabions

line each side or cheek of the embrasure at the neck of the latter.

A *gabionnade* is any lodgement consisting of a parapet hastily formed by placing on the ground a row of gabions, and filling them with earth obtained by digging a trench parallel to the line, in their rear.

GADDI. The name of a celebrated old Florentine family of artists of the 13th and 14th centuries.

Gaddo Gaddi, the friend of Andrea Tafi and Cimabue, was born at Florence in 1249. Gaddo was a painter and mosaic-worker, and assisted Tafi in the mosaics of San Giovanni. He executed alone the mosaic of the 'Coronation of the Madonna,' in Santa Maria del Fiore, which is still extant, and which obtained for him a reputation all over Italy, and important commissions from Clement V. at Rome. He died in 1312, and was buried in Santa Croce, where his son Taddeo painted his portrait beside that of Andrea Tafi, in a Marriage of the Virgin in the Capella Baroncelli.

Taddeo Gaddi was a much more able man than his father, after whose death he lived twenty-four years with Giotto, who was his godfather. He was the most distinguished of Giotto's scholars and imitators. His best remaining works are perhaps the frescoes of the Giugni Chapel, in the Church of Santa Croce at Florence. Taddeo was likewise a distinguished architect; he built the present Ponte Vecchio in 1345. He amassed great wealth, established a family, and the Gaddi have been for many centuries one of the most distinguished houses of Florence. It is not known when Taddeo died; he was living in 1366. He was buried near his father in Santa Croce.

His most distinguished scholars were Giovanni da Milano and Jacopo da Casentino, to whom he intrusted the care of his sons Giovanni and Angelo: the former died young, after giving great promise as a painter.

Angelo Gaddi excelled in colour, and generally in the technical practice of the period, which appears to have been thoroughly established in his time. He however executed several great works, especially in Santa Croce, in imitation of Giotto and his father, though he was inferior to both in expression, and to his father in design. He established a commercial house at Venice, and realised a great fortune. He died about 1389.

Angelo left two distinguished scholars, Stefano da Verona, and Cennino Cennini, who is the author of the earliest known treatise on painting, 'Trattato della Pittura,' Rome, 1821; it was written in 1437.

GADEBUSCH, FREDERIC CONRAD, a learned German, born in 1719, in the island of Rügen. After having studied at different universities of Germany, he went in 1750 to Livonia, where he remained till his death in 1788. He was a very laborious writer, and left several works in German, which throw great light on the history of the Baltic provinces of Russia. His principal works are—'Memoir on the Historians of Livonia,' Riga, 1772; 'Livonian Bibliotheca,' Riga, 1779; 'Essays on the History and Laws of Livonia,' Riga, 1777-1785; 'Annals of Livonia, from 1030 to 1761,' 8 vols. 8vo., Riga, 1780-1783.

GADES. [Cadiz.]

GADIDÆ, a family of fishes of which the common Cod-fish may serve as the type. [Malacopterygii.]

GADWALL. [Ducks.]

GAEL, GAELIC. Although the language spoken by the Scottish Highlanders is familiarly known among the Lowlanders by the name of the *Erse*, or, according to the more usual pronunciation, the *Ersh*, that is, plainly, the Eirish or Irish, the people themselves are never called by that name. Among the Highlanders the name Erse is unknown. They call themselves only the *Gadhel*, also sometimes written and always pronounced *Gael;* and their language the *Gaedheilg*, pronounced *Gaeilg*, or, nearly *Gaelic*. The name *Gaelic* is also in familiar use among the Lowlanders as that of the language. Further, the only name by which the Irish are known to the Scottish Highlanders is *Gael*. The latter call themselves *Gael Albinnich*, or the Gael of Albin, and the Irish *Gael Erinnich*, or the Gael of Erin. The Irish also call themselves the *Gadhel*, or *Gael*, and their language the *Gaelic*. Finally, the Welsh call the Irish *Gwyddel*, which is evidently the same word with *Gadhel* or *Gael*.

It has been generally assumed that the modern Gael are a portion of the *Galli*, or Gauls, of the Romans, and the Galatæ of the Greeks. The grounds of this opinion are the similarity of the two names—some historical and traditional testimony to the fact that South Britain was originally peopled from Gaul—some traces, rather faint and disputable, of identity of institutions and customs—and, what would be the strongest argument if it were well made out, the evidences of identity of language conceived to be established by the comparison of the names of places in France, and a few other remains of the old language spoken there, with the modern Gaelic of Scotland and Ireland.

Supposing the Gael to be the *Galli* of the Roman writers, and the Galatæ (*Γάλαται*) of the Greek, a question arises as to whether these names are the same with the *Celtæ* or *Celti*, or *Keltai* (*Κελται*), sometimes spoken of by the ancients as a general name for the Gauls, sometimes as the name of only a certain portion of the Gauls. It has been contended in modern times, on very plausible grounds, that this notion is a mistake, and that the Celts were only a section of the Gauls, which was always the generic name.

The most recent publication on the subject of the Gael, in English, is 'The Highlanders of Scotland, their Origin, History, and Antiquities,' by W. F. Skene, 2 vols. 8vo., London, 1837, being an essay to which a prize had been awarded by the Highland Society of London. Mr. Skene's views and reasonings are of very considerable ingenuity as well as novelty; but whatever may be thought of the part of it which relates to the origin of the Gael, the work is undoubtedly in other respects one of the most important contributions to early Scottish history that modern research has furnished.

GAERTNER, JOHANN ANDREAS, was the son of Andreas Gaertner, a Dresden architect and artist of considerable reputation in the early part of the last century, and was the nephew of Johann Gaertner, an artist of the same period and the same place. He was born at Dresden in 1743. In the service of Count Minitszek, in Poland, he applied himself to engineering as well as architecture. After that he visited Vienna, Berlin, and Paris, where he stayed nine years, then went to Coblentz, to finish the electoral palace. In consequence of the French Revolution, he went to Würzburg, and erected many superior buildings for the Prince-Bishop. In 1804 he returned to Munich, where he was appointed to an office. His designs however were not adopted, and he felt the disappointment bitterly. He died in 1826. Could he have foreseen the success of his son, Frederick Von Gaertner, who has adorned Munich with some of the noblest of modern structures, he would probably have borne his own disappointments with less impatience of temper.

GAE'TA (the ancient *Cajeta*), a strongly fortified town and a bishop's see in the province of Terra di Lavoro in the kingdom of Naples, is situated on a lofty promontory which projects into the Mediterranean, and forms one side of the Gulf of Gaeta, the ancient Sinus Formianus, which rivals in beauty of scenery the neighbouring Bay of Naples. Gaeta, with its suburbs, has a population of about 13,000. It has a harbour, and carries on some trade by sea. Among the remains of antiquity are the circular monument called Torre di Orlando, which is the mausoleum of L. Munatius Plancus, and another tower called Latratina, which was once part of a temple. In the cathedral is a baptismal vase of Parian marble, with highly finished rilievis.

GAFO'RIUS, FRANCHI'NUS, a learned writer on music, was born of humble parents, at Lodi, in 1451. While a boy, he studied music under a Carmelite named Godendach. He then went to Verona, publicly taught music there during some few years, and also wrote his work, 'Musicæ Institutiones Collocutiones.' He visited many Italian cities, and wrote several musical works, among which the chief was his 'Practica Musica utriusque Cantus.' Gaforius died about 1520.

GAGE, any apparatus for measuring the state of a phenomenon. But the term is usually restricted to some particular instruments, such as the gage of the air-pump, which points out the degree of exhaustion in the receiver, the wind-gage [Anemometer and Wind-Gage], the tide-gage, &c., &c., all of which are mentioned in connexion with their several subjects.

GA'GEA, a genus of plants belonging to the natural order *Liliaceæ*, and the tribe *Asphodeleæ*. *G. lutea* is a native of England and Scotland in woods, but is a rare plant. It is a native of Europe, and is found on the Alps in Switzerland. Koch describes ten species of this genus as natives of Germany and Switzerland.

GAHNITE, a mineral which occurs crystallised in regular octahedrons and varieties, in Sweden and America. It is of a dark blueish green colour, nearly opaque. Before the blow-pipe it is unalterable alone, and nearly so with fluxes. It consists chiefly of alumina and oxide of zinc.

GAIL, JEAN BAPTISTE, born at Paris, July 5, 1755, was made, in 1791, Professor of Greek Literature in the Collège de France. In 1794 he married Mademoiselle Sophie Garre, who afterwards became celebrated as a musical composer. Gail was the author of numerous works, besides editions of the Greek classics, among which are Homer, Herodotus, Thucydides, Xenophon, and Lucian. His 'Grammaire Grecque,' 1799, has gone through numerous editions. He published also a 'Cours de Langue Grecque, ou Extraits de différens Auteurs, avec Traduction interlinéaire en Latin et en Français,' 1797-99; 'Observations sur les Idylles de Théocrite et les Eclogues de Virgile,' 1805; 'Le Philologue, ou Recherches Historiques, Géographiques,' &c., 22 vols., with Atlas, Paris, 1814-28, a valuable collection; and a 'Géographie d'Hérodote, avec Atlas, et les Plans des Batailles,' &c., 2 vols., Paris, 1823. In the latter part of his life he was keeper of the Royal Library, at Paris, where he died, Feb. 5, 1829.

GAILLAC. [Tarn.]

GAILLARD. [Eure.]

GAILLARD, GABRIEL HENRI, was born in 1726. He left the bar in order to devote himself to literature. In 1757 he published the History of Mary of Burgundy, daughter of Charles the Bold and wife of the Emperor Maximilian I. This work had great success. In 1766 was published his 'History of Francis I. of France,' followed by his 'History of Charlemagne,' 1782. This work met with great success, and received the praises of Gibbon and of the celebrated German historian Hegewisch, who himself wrote a history of Charlemagne in German. The best work of Gaillard is his 'History of the Rivalry between France and England.' His 'Rivalry of France and Spain' is written on the same plan. Gaillard was the author of many other works. He died in 1806, in consequence of his severe application.

GAILLON. [Eure.]

GAINSBOROUGH. [Lincolnshire.]

GAINSBOROUGH, THOMAS, born in 1727, at Sudbury, in Suffolk, was one of the most eminent English landscape-painters of the last century. His father was poor, and he received little school education; but in the woods of Suffolk he acquired that relish for and knowledge of the beauties of quiet nature for which his early pictures are so peculiarly distinguished. He had painted several landscapes before he was twelve years of age, when he was sent to London. There he was for some time with Mr. Gravelot, the engraver, and Hayman, the painter, with whom he did not remain long, but, setting up as a portrait-painter, supported himself, till, at the age of nineteen, he married a young lady who had a fortune of 200*l.* per annum. On his marriage he went to Ipswich, where he resided till 1758, when he removed to Bath. Having practised portrait painting with increasing success, he removed in 1774 to London; and having painted portraits of some of the royal family, which were

much admired, he soon acquired extensive practice and proportionate emolument. He died in August 1788. His fame chiefly rests on his landscapes. Reynolds said of him, 'that, if ever this nation should produce genius sufficient to acquire to us the honourable distinction of an English school, the name of Gainsborough will be transmitted to posterity as one of the very first of that rising name.'

GAIUS, a Roman jurist, who survived Antoninus Pius, and lived also in the time of M. Aurelius. Pius died A.D. 161. Gaius belonged to the school or sect of the Sabiniani; and this is all that we know of him. Though he was a voluminous writer, and several of his works are excerpted in the Digest, he is never quoted by any of the jurists who are posterior to him; at least, not in any of the excerpts from these jurists which are contained in the Digest. A list of his works is given in the Florentine Index. Of these works the principal are the thirty-two books Ad Edictum Provinciale; the ten books Ad Edictum Urbicum; the seven books of Aurea; and the four books of Institutiones. The number of excerpts from Gaius in the Digest is 535. The Institutiones of Gaius formed the groundwork of the Institutiones of Justinian; and the discovery of the original work of Gaius is one of the most valuable additions made to our knowledge of the Roman law since it has been cultivated in Western Europe. In the library of the chapter of Verona there is a palimpsest MS., that is, a MS. from which the original writing has been obliterated to make room for something else. This MS., now called No. XIII., originally contained the Institutiones of Gaius, which had been rubbed out to receive the letters of St. Jerome. In 1816 Niebuhr deciphered the original writing on the 97th leaf of the MS., which he easily recognised to be the work of a Roman jurist, and Savigny pronounced the leaf to belong to the Institutiones of Gaius. The MS. was carefully copied by Goeschen and Hollweg in 1817, so far as it was not become illegible by erasure. The work was one of extreme labour, owing to the pains that had been taken to erase the original writing; but yet, by the industry of the German scholars, the greater part of the text of Gaius has been recovered: it is estimated that about one-tenth is past recovery. An edition of the text of the Institutiones of Gaius by Goeschen appeared in 1821. Blume made a fresh collation of the Verona MS. A second edition by Goeschen appeared in 1824, and a third edition under the care of Lachmann appeared in 1842.

The edition of the Institutiones of Justinian by Klenze and Böcking, Berlin, 1829, contains the text of the Institutiones of Gaius placed by the side of, and arranged in the order of, the work of Justinian's jurists. The work of Gaius was intended to be used as an elementary introduction to the study of the Roman law; it was the first book of the kind that the Romans had, at least the first book of the kind with the title of Institutiones; and for some time after the age of the Antonines it was in great repute. Its merit was recognised by the jurists of Justinian, who made much use of it in the composition of the Institutiones of Justinian, which from that time became the elementary textbook on the Roman law. The Institutiones of Gaius are divided into four books. The division of the matter of law by Gaius is into the law which relates to Persons (Personæ); Things (Res); and Actions (Actiones). The first book treats of persons only in a limited sense, for it is limited to persons as members of Family: all the rest that is said about persons is merely for the purpose of better explaining the real matter of the first book. The second and third books treat of Things, that is, Ownership and Obligations. The fourth book treats of Actions. The work accordingly is limited to Jus Privatum. Savigny's exposition of the method of this institutional work is the only one that is consistent with the work itself. ('System des Heut. Röm. Rechts,' i. 397.) Many of the ordinary expositions are confused and inaccurate. According to an opinion preserved by Theophilus, the matter which treats of Things is terminated in the third book (§ 88); and the matter which relates to Actions begins with the Obligationes. Though this would be theoretically an inaccurate view of the matter, we must not, for that reason, conclude that it is not the view of Gaius. However, the reasons in favour of the matter of Things being considered by Gaius himself to end with the third book seem to be weightier than the reasons alleged in support of the opinion which Theophilus has recorded.

GALACTIN is the principal ingredient in the sap of the Cow Tree (*Galactodendron utile*) of South America. When the sap is allowed to stand awhile, matter rises to the surface, which is soluble in boiling water, and is deposited when the water cools. It is then to be well washed, and dried in vacuo over sulphuric acid. At 60° it is soft and ductile, but at 137° it is liquid. It is tasteless, translucent, and brittle, and has the appearance of a resin. Specific gravity, 0.969. Soluble in oil of turpentine and olive oil. It is isomeric with Brazil wax, being composed of 6 equivalents of carbon, 6 of hydrogen, and 1 of oxygen.

GALACZ. [MOLDAVIA.]

GALANGA, or GALANGAL, is usually supposed to have been introduced by the Arabs, but it was previously mentioned by Aetius. The plant which yielded this root was long unknown, and it was supposed to be that of pepper, of an iris, of *Acorus calamus*, or to be the *Acorus* of the ancients. *Kæmpferia galanga* was so called from its aromatic roots being supposed to be the true Galangal. The tubers of *Cyperus longus* were sometimes substituted, and called English Galangal. Two kinds, the large and the small galangal, are described.

The greater Galangal has long been known to be the produce of a scitamineous plant, the *Galanga major* of Rumphius, which is the *Alpinia galanga* of Willdenow, and a native of China and the Malayan Archipelago. The roots, perennial and tuberous, like those of the ginger, are identical with the *Galanga major* of the shops.

Several species of this genus have roots with somewhat similar properties. Thus *Alpinia alba* and *Chinensis* are much used by the Malays and

Chinese. The former has hence been called *Galanga alba* of Kœnig; and the latter has an aromatic root with an acrid burning flavour. The fragrant root of *A. nutans* is sometimes brought to England, according to Dr. Roxburgh, for *Galanga major*. Its leaves, when bruised, have a strong smell of cardamoms, and the Cardamomum plant is frequently placed in this genus.

GALANI'NO, the name by which *Baldassare Aloisi* is generally known. He was born at Bologna in 1578, was educated in the school of the Carracci, and became one of the most distinguished of the Italian portrait painters: he is sometimes called the Italian Vandyck. He practised chiefly at Rome. Galanino was also a very able historical painter and a skilful etcher. He died in 1638.

GALANTHUS, a genus of amaryllidaceous plants consisting of the Snowdrop and another species. The former plant is a native of subalpine woods in various parts of Europe; the second, which is the *G. plicatus* of botanists, inhabits the Asiatic provinces of the Russian and Turkish empires.

GALAPAGOS ISLANDS are a group of islands in the Pacific, which lie between 1° N. lat. and 2° S. lat., and between 89° and 92° W. long. They consist of six larger and seven smaller islands. The largest is Albemarle Island, which is 60 miles in length, and about 15 in breadth. The highest part is 4000 feet above the sea. Charles Island, now called La Floriana, is 20 miles long, and about 15 miles wide.

The Galapagos Islands are of volcanic origin, and consist of enormous masses of lava rising abruptly from a fathomless sea. Along the shores nothing but heaps of broken lava meet the eye; but, in the interior, valleys and plains of moderate extent occur, which are covered with shrubs, especially the Prickly Pear. This cactus supplies with food the land tortoises, which are of an enormous size, and frequently weigh 300 or 400 pounds. There are also iguanas and innumerable crabs.

In 1832 a Spanish settlement was formed on the Island of La Floriana, by permission of the government of Ecuador. The settlement is 1000 feet above the level of the sea, so that the heat is not so great as might have been expected from the geographical position of the island. The inhabitants cultivate bananas, sugar-cane, sweet potatoes, and Indian corn in such quantities, that they can provide with these articles the whalers, who frequently resort to the island.

(Captain Basil Hall's *Extracts from a Journal*, &c.; *London Geographical Journal*, vol. vi.)

GALASHIELS. [SELKIRKSHIRE.]

GALATA. [CONSTANTINOPLE.]

GALATÆ. [CELTÆ.]

GALATHE'A, GALATHEIDÆ, a group of Crustaceans corresponding with the genus *Galathea* of Fabricius, and establishing, in the opinion of M. Milne Edwards, a passage between the anomurous and macrurous Crustaceans, being more particularly approximated to the *Porcellanæ*. Dr. Leach divided the genus established by Fabricius into four: viz. the true *Galatheæ*, *Munidea*, *Grimothea*, and *Æglea*. M. Milne Edwards thinks that three of these genera should be preserved, but agrees with M. Desmarest in coming to the conclusion that the genus *Munidea* has not sufficient characteristics to admit of its adoption in a natural classification. With regard to *Æglea*, M. Milne Edwards considers it as approximating more to the *Porcellanæ* than to the *Galatheæ*, and as occupying a place in the section of the *Anomura*.

Thus then, according to Milne Edwards, this family contains only two genera, viz. *Galathea* and *Grimothea*. The general characters are as follow:—Carapace depressed and wide, but still longer than its width, terminating anteriorly by a rostrum more or less projecting, which covers the place of the ocular peduncles, and presents on its upper surface many furrows or wrinkles, among which one deeper than the rest defines the posterior part of the stomachic region. Antennæ inserted on the same transversal line; internal antennæ but little elongated, placed under the ocular peduncles, and terminated by two small multiarticulate, very short filaments; external antennæ with no trace of palpiform appendages at their base, but with a cylindrical peduncle and a long and slender terminal filament. External jaw-feet (pates-mâchoires) always pediform, but varying a little in their conformation. Sternal plate (plastron sternal) widening a good deal posteriorly, and the last thoracic ring ordinarily distinct. Anterior feet large, and terminated by a well-formed claw; those of the three following pairs of limbs rather stout, and terminated by a conical tarsus; fifth pair very slender, and folded above the others in the branchial cavity; these last do not assist the locomotion, and are terminated by a rudimentary hand. Abdomen nearly as wide as the thorax, and longer, vaulted above, and armed on each side with a row of four or five large teeth formed by the lateral angle of the superior arch of the different rings composing it, and terminated, as in the greater part of the macrurous Crustaceans, with a large fan-shaped lamelliform fin. The number of abdominal false feet varies; in the male there are five pairs, the two first of which are slender and elongated, and the three last are terminated by an oval lamina ciliated on the edge; in the female, the first abdominal ring is without appendages, but the four following segments have each a pair of false feet composed of three joints placed end to end, and fringed with hairs for the attachment of the eggs.

Examples.—*Galathea strigosa*; *G. spinifera*; from the seas of Europe. *G. Monodon*, from the coasts of Chili. *Grimothea gregaria* and *Grimothea Duperreii*. The term *Galathea* was employed by Brugnières to designate a genus of Conchifers, which according to Rang might perhaps be united to *Cyrena*.

GALA'TIA, a country of Asia Minor, which originally formed part of Phrygia and Cappadocia. Its boundaries differed at various times. It was bounded on the south by Phrygia and Cappadocia, on the east by Pontus, on the north by Paphlagonia, and on the west by Bithynia. It obtained the name of Galatia from the settlement of a large body of Gauls in this part of Asia. The first

horde that appeared in Asia (B.C. 279) formed part of the army with which Brennus invaded Greece. Encouraged by the success of their countrymen, fresh hordes passed over into Asia, and their numbers became so great that Justin informs us (xxv. 2) 'that all Asia swarmed with them; and that no Eastern monarch carried on war without a mercenary army of Gauls.' The first check they received was from Attalus I., king of Pergamus, who defeated them in a great battle (B.C. 239), and compelled them to settle permanently in that part of Asia which was afterwards called Galatia. (Livy, xxxiii. 21; Polybius, xviii. 24.) They gave Antiochus great assistance in his contest with the Romans, and Cn. Manlius the consul was sent against them, B.C. 189. The particulars of this war, which terminated in the complete defeat of the Galatians, are recorded in Livy (xxxviii. 12–27). From this time they were in reality subject to Rome, though allowed to retain their own native princes. In the war against Mithridates, Deiotarus, originally only a tetrarch of one of the Galatian tribes, assisted the Romans, for which he was rewarded by the grant of Pontus and Little Armenia, and the title of king by the Roman senate. [DEIOTARUS.]

Strabo says that Galatia was inhabited by three tribes of Gauls: the Trocmi, the Tectosages, and the Tolistobogii. Each tribe was subdivided into four parts, and each tribe was governed by a tetrarch, who appointed a judge and an inspector of the army. The power of these twelve tetrarchs was limited by a senate of 300, who took cognisance of all capital cases. All other offences were left to the jurisdiction of the tetrarchs and judges. This form of government continued till shortly before the time of Deiotarus. All the tribes spoke the same language, and had the same customs. Though they afterwards spoke Greek, they had not forgotten their native tongue in the time of Jerome, who says that they then spoke the same language as the Tréviri.

Galatia possessed few towns of importance, with the exception of Ancyra, Tavium, and Pessinus. Pessinus the capital of the Tolistobogii, north-east of the river Sangarius, was a great trading place, with a magnificent temple, sacred to the mother of the gods, who was there worshipped under the name of Agdistis. On the river Sangarius in this province was the ancient Gordium, formerly the capital of the Phrygian monarchy.

Galatia was also called Gallo-Græcia, and its inhabitants Gallo-Græci, from the intermixture of the customs and languages of the Gauls and Greeks in this province.

GALATIANS, ST. PAUL'S EPISTLE TO THE, one of the canonical books of the New Testament. Its authenticity has never been doubted, though the date is uncertain. From the internal evidence connected with St. Paul's movements, it is supposed to have been written between A.D. 48 and A.D. 58. It appears that some Judaising teachers had persuaded the Gentile converts to adopt circumcision, and sought to weaken St. Paul's authority. In this epistle St. Paul vindicated his authority as from Christ himself, argued that the law had been a preparation for Christianity, and exhorted them not to use the liberty which the Gospel gave them 'for an occasion to the flesh, but by love to serve one another.'

GALAXY. [MILKY WAY.]

GALBA, SERVIUS SULPICIUS, born, under the reign of Augustus, of a patrician family, served with distinction in Germany, was afterwards proconsul, first in Africa, and afterwards in the Tarraconensis province of Spain, in which office he acquired a reputation for justice and moderation. He was in Spain when Julius Vindex, the proconsul of Celtic Gaul, rose against Nero, A.D. 68, and urged Galba to do the same. Upon Galba declaring against Nero, he was selected as emperor by his soldiers, but he declared that he was only acting as the lieutenant of the senate and people of Rome, to put an end to the tyranny of Nero. The prætorian guards at Rome, after having revolted against Nero, proclaimed Galba, and the senate acknowledged him as emperor. Galba hastened from Spain to Rome, where he began by calling to account those favourites of Nero who had enriched themselves by proscriptions and confiscations, and by the senseless prodigality of that prince; but most of them had dissipated their ill-gotten wealth. Galba exercised great parsimony in the administration, and endeavoured to restore discipline among the soldiers. The emperor, who was past seventy years of age, soon became the object of popular dislike and ridicule; his favourites were hated, and revolts against him broke out in various quarters, several of which were put down and punished severely. Galba thought of strengthening himself by adopting Piso Licinianus, a young patrician of considerable merit, as Cæsar and his successor; upon which Otho, who had expected to be the object of his choice, formed a conspiracy among the guards, who proclaimed him emperor. Galba caused himself to be carried in a litter, hoping to suppress the mutiny; but at the appearance of Otho's armed partisans his followers left him, and even the litter-bearers threw the old man down and ran away. Some of the legionaries came up and put Galba to death, after a reign of only seven months, counting from the time of Nero's death, June, A.D. 68. Galba was seventy-two years of age. He was succeeded by Otho. (Tacitus, *Histor.* i. 1–42; Suetonius, *Galba;* Dion Cassius, lxiv. 1–6.)

Coin of Galba.
British Museum. Actual Size. Brass.

Reverse.

GA'LBANUM. The plant usually believed to yield this well known gum-resin is *Bubon Galbanum*, a native of the Cape of Good Hope, which Hermann described as yielding spontaneously, by incision, a gummy resinous juice, similar to Galbanum; but Mr. Don has observed that this plant possesses neither the smell nor the taste of Galbanum, but in these particulars agrees better with fennel; and its fruit has no resemblance whatever to that found in the gum. The fruit, commonly called seed, was early ascertained by Lobel to be that of an umbelliferous plant, broad and foliaceous, which he picked out of Galbanum, and, having sowed, obtained a plant, which he has figured under the name of *Ferula galbanifera*. As the plant is still unknown, it is well worthy the investigation of travellers in the East, who might otherwise suppose, from the name, assigned from the seed, having been adopted in the 'London Pharmacopœia,' that the plant was as well known as its product.

Three sorts of Galbanum are distinguished:—1, galbanum in grains or tears; 2, galbanum in masses; and 3, Persian galbanum. The first two come from Africa, especially from Æthiopia; the third sort from Persia. Galbanum in tears is most likely the spontaneous exudation from the plant; and that in masses, obtained by incision. The first occurs in irregular generally oblong grains, mostly distinct, but sometimes agglutinated together, about the size of a lentil or small pea, of a colour verging from whitish into yellowish brown, more or less diaphanous, opaque, or shining with a resinous lustre. The odour is strongly balsamic and disagreeable. The taste is resinous, sharp, bitter, and disagreeable. Specific gravity, 1.212. It is partially soluble in alcohol, and the solution, as well as the strong white smoke which is evolved when galbanum is melted in a platinum spoon, reddens litmus paper. It consists chiefly of resin, gum, volatile oil, and a trace of malic acid.

Galbanum in masses consists of irregular pieces of a yellowish or dark brown colour; the odour is stronger than that of the preceding kind, which, in its general characters, it much resembles, except that it can be powdered only during the low temperature of winter. Geiger says, that when this variety is pure, it is not to be reckoned inferior to the former. Persian galbanum, being very soft and tenacious, is sent in skins or chests. It often contains many fragments of plants.

Galbanum, like other umbelliferous gum-resins, is antispasmodic, expectorant, and externally rubefacient. It is inferior in power to assafœtida, but usually associated with it in pills and plasters.

GALE'NA. [Lead.]

GALE'NUS, CLAU'DIUS, one of the most celebrated and valuable of the ancient medical writers, was born at Pergamum, A.D. 131. The exact time of his death is not known; but, as he speaks of Pertinax and Severus as emperors, we may conclude that Suidas (v. Γαληνός) is not far from the truth in stating that he lived to the age of seventy. He was early instructed in the doctrines of the Aristotelian and Platonic philosophy, and appears also to have devoted some time to the study of the peculiar tenets of the other sects; for, while yet very young, he wrote commentaries on the Dialectics of the Stoic Chrysippus.

His anatomical and medical studies were commenced under Satyrus, a celebrated anatomist; Stratonicus, a disciple of the Hippocratic school; and Æschrion, a follower of the Empirics. After the death of his father, he travelled to Alexandria, at that time the most famous school of medicine in the world. His studies were so zealously and successfully pursued, that he was publicly invited to return to his native country. At the age of 34 he settled himself in Rome, where his celebrity became so great from the success of his practice, and more especially from his great knowledge of anatomy, that he quickly drew upon himself the jealousy of all the Roman physicians. At the solicitation of many philosophers and men of rank, he commenced a course of lectures on anatomy; but by the jealousy of his rivals he was quickly compelled to discontinue them, and eventually to leave Rome entirely.

The instruction which Galen had received in the principles of the various sects of medical philosophy had given him an acquaintance with the peculiar errors of each, and he speaks of them at all times in the language of no measured contempt. The school which was founded by himself may justly merit the title of Eclectic, for its doctrines were a mixture of the philosophy of Plato, of the physics and logic of Aristotle, and of the practical knowledge of Hippocrates. On many occasions he expresses himself strongly on the superiority of theory to mere empiricism; but upon those matters which do not admit of being objects of experience, such as the nature of the soul, he confesses his ignorance and inability to give any plausible explanation.

Anatomy seems to have been a favourite pursuit of Galen, but he had very few opportunities of studying it, and certainly very rarely dissected a human subject. His conclusions therefore are frequently very erroneous, and not to be relied on.

In order to form correct physiological views, it is necessary to employ many and varied experiments, and to modify them in different ways, that we may be able to satisfy the numerous conditions which every problem in physiology presents. To this mode of inquiry Galen sometimes had recourse, and it were to be wished that he had more frequently made use of it. To

prove the dependence of muscular motion upon nervous influence, he divided the nerves which supply the muscles of the shoulder, and found that after the division all power of motion ceased. But he does not seem to have noticed that the nervous influence is only one of the many stimuli which call the muscles into action. As he considered the heart to be devoid of nerves, he might have avoided this error, had he not fortified himself against the truth by assuming that its structure is not muscular. He also deprived animals of their voice by dividing the intercostal muscles, by tying the recurrent nerve, or by injuring the spinal cord. In theoretical physiology his arrangement of the vital phenomena deserves to be particularly recorded, as it forms the groundwork of all the classifications which have since been proposed. It is founded upon the essential differences observed in the functions themselves. Observing that some of them cannot be interrupted without the destruction of life, and for the most part are unconsciously performed, whilst another class may be suspended without injury, are accompanied by sensation, and subject to the power of the will, he divided the functions into three great classes. The vital functions are those whose continuance is essential to life; the animal are those which are perceived, and for the most part are subject to the will; whilst the natural are performed without consciousness or control. He then assumed certain abstract principles upon which these functions were supposed to depend. He conceived the first to have their seat in the heart, the second in the brain, and the third in the liver. Thus the pulsations of the heart are produced by the vital forces, and these are communicated to the arteries by the intervention of the pneuma—this is the more subtle part of the air, which is taken in by respiration, and conveyed from the lungs to the left side of the heart, and from thence to the different parts of the body. In the brain the pneuma forms the medium by which impressions from external objects are conveyed to the common sensorium. The same principle is applied to the explanation of the natural functions also. Observing that these forces are not sufficient for the explanation of the different vital phenomena, Galen had recourse to the doctrine of elements, of which, after the example of Aristotle, and before him Plato in the 'Timæus,' he admits four, and from the mixture of these deduces the secondary qualities.

One of his theories is, that health consists in the perfect and harmonious admixture of these various elements. But we must assume, in addition, that the body is free from pain, and that there is no obstacle to the due performance of the functions. From this idea of health we may easily form the conception of disease. It is that state of body in which the functions are in any way interrupted. It depends upon some disproportion in the constituent elements, or some unnatural condition of the organs. The causes of disease are divided by Galen into occasional and predisposing. The latter are supposed to depend upon some degeneration of the humours. This degeneration was called by him a putrefaction. Thus the quotidian fever is referred to the putrefaction of the mucus; tertian, to that of the yellow bile; and quartan, to that of the black bile—this last humour being slow of motion, and requiring a greater time for the completion of the paroxysm. It was upon this theory of the putrefaction of the humours that the practice of physicians was founded for centuries after the death of Galen, and their remedies were directed to the expulsion of the supposed offending matter. Inflammation depends, according to Galen, upon the passage of the blood into those parts which, in their normal condition, do not contain it. If the blood be accompanied by the spirits, the inflammation is spirituous; if the blood penetrates alone, it is phlegmonous. Erysipelatous inflammation is caused by the admixture of bile; œdematous, by that of mucus; and schirrous, by the addition of black bile.

The reputation of Galen was established upon the general reception which his theories met with; and his passion for theorising was so great, that he has left us but few good descriptions of disease. In these his principal object seems to have been to display his own talent for prognosis. He is said to have occasionally performed surgical operations, but during his stay in Rome he commonly refused to do so, in compliance with the custom of the Roman physicians.

The unbounded influence which the authority of this great and learned physician exercised over the minds of his successors unquestionably contributed to retard the progress of medicine; for, while physicians were occupied in the study of his works, and in vain attempts to reconcile the phenomena of nature with the dicta of their master, they had little time and less inclination to interrogate Nature herself, and pursue the study of medicine in those fields in which alone it can be followed with success.

Galen was a most voluminous writer. Though many of his works are said to have been burnt in his house at Rome, and others in the course of time have been lost, there are still extant one hundred and thirty-seven treatises and fragments of treatises, of which eighty-two are considered undoubtedly genuine. The writings of Galen are valuable, not only for the history of medicine, but the great variety of miscellaneous matter which they contain.

GALEOPSIS, a genus of plants belonging to the natural order *Labiatæ* or *Lamiaceæ*. It may be easily recognised by the peculiar formation of its anthers, which differs from any other of the *Labiatæ*. *G. ochroleuca*, the Cream-Coloured Hemp Nettle is found in the sandy corn fields of Middle Europe, and also in England and Wales. The flowers are of a pale yellow or cream-colour, and bloom during the months of July and August. *G. ladanum*, the Red Hemp Nettle, is a native throughout Europe, and is found plentifully in the sandy corn-fields of Great Britain. The flowers are of a purple colour, variegated with crimson and white. A variety of this species, with flowers half the usual size, is the *G. intermedia* of Reichenbach, and the *G. parviflora* of Lambert. *G.*

tetrahit, the common Hemp Nettle is of a purple colour, and is a native of cultivated ground throughout Europe and Middle Asia, and is plentiful in Great Britain.

GALERIUS. [MAXIMINIANUS.]

GALIA'CEÆ, a natural order of exogenous plants, called *Stellatæ* by Linnæus, and merged in *Cinchonaceæ* by the school of Jussieu. It consists of herbaceous, usually square-stemmed plants. Some yield a dyeing substance in their roots, as the various species of Madder, but the greater part are useless weeds. One of our common British species of Galium, viz. *G. verum*, is astringent, and was formerly used by farmers to curdle milk.

GALIA'NI, FERDINANDO, was born at Chieti, in the Abruzzo, in 1728, and studied at Naples, where he first attracted attention in 1749 by some humorous compositions, ridiculing certain pedantic academicians. In the following year his important work, 'Della Moneta,' 'on the Coin,' or currency, was published. In this he advocated the principle that money is a merchandise, and that its value and interest ought to be left free like other goods; also, that abundance of money and consequent high prices are not an evil, as was supposed by many, and that, in countries where low prices prevail, the people are generally most miserable. This work produced a great sensation on the Continent, and especially at Naples, where the government adopted its principles, and left the trade in bullion free. It is generally believed that Bartolommeo Intierri and the Marquis Rinuccini, two Tuscan economists of that time, furnished Galiani with the staple of this work. He published a second edition in 1780, with additions.

In 1759 Galiani was sent to Paris as secretary of legation, and became a great favourite. And there he wrote 'Dialogues sur le Commerce des Blés.' In this he enters upon the great subject of Corn Laws.

On his return to Naples, Galiani was appointed by the king to the Board of Trade, and afterwards to the Board of Finances, and to the superintendence of the crown domains. He died in October 1787.

GALI'CIA, a province in the north-west of Spain, is bounded N. by the Bay of Biscay, W. by the Atlantic, S. by Portugal, and E. by Asturias and Leon. Its greatest length from Cape Ortegal to the south-eastern angle of the province is over 130 miles, and its greatest breadth about 120. Its area is about 15,000 square miles, and the population is about 1,600,000. The country is mountainous, being covered by several offsets of the Asturian chain, one of which runs westward towards Cape Finisterre; another runs to the south-west along the right bank of the Miño, dividing the waters of that river from those of the Ulla and the Tambro, and reaches the coast of the Atlantic south of Vigo; whilst a third ridge crosses the south of the province, dividing the feeders of the Miño from those of the Douro, and extending into Portugal. The principal rivers are — 1, the *Miño*, which rises in the mountains of Mondoñedo, in the north of the province, flows southwards by Lugo and Orense, and receives the Sil, which comes from Leon and the mountains of Astorga; on touching the frontiers of Portugal, it runs W. along the boundary of Galicia and Portugal to its entrance into the Atlantic below Tuy: 2, the *Tambro*, which rises in the mountains north of Sant Iago de Compostela, and flows S.W. into the Atlantic: 3, the *Ulla*, which rises in the centre of the province, and, flowing westwards, enters the Atlantic south of the Tambro: 4, the *Lima*, which rises in the mountains S.E. of Orense, and, flowing S.W. into Portugal, enters the Atlantic through the harbour of Viana. The principal products of Galicia are wine, fruits, flax, wheat, barley, maize; good pastures, which feed a vast quantity of cattle; and abundance of chestnuts, which constitute a common food of the peasantry. The forests supply plenty of fuel and timber. The climate is generally chill and moist, but more temperate on the sea-coast than in the interior. The Gallegos or Galicians are a hardy, industrious, and docile people. Many of them visit Portugal, where they are employed as porters and water-carriers; and they have an established reputation for honesty. The principal manufacture of the country is linen.

The population of Galicia is almost entirely agricultural; landed property is much subdivided, and the great majority of the people live in detached dwellings on their lands. The province is divided into four districts, named from the chief town in each, namely, Coruña, Lugo, Orense, and Pontevedra. The Audiencia Real or supreme court of justice for the province is held in Coruña, which is also the residence of the captain-general or military governor. There are but few towns; the principal are as follows:—1, *La Coruña*. [CORUNA]: 2, *St. Iago de Compostela* [COMPOSTELA]: 3, *Betanzos*, with 5000 inhabitants, on the river of the same name, has a few manufactories, and some trade in wine and pickled anchovies and pilchards, which are taken all along this coast: 4, *Mondoñedo*, a bishop's see with 6000 inhabitants, has a college, and a seminary for clerical students. 5. *Lugo*, the ancient Lucus Augusti, which stands on the left bank of the Miño, has 7200 inhabitants; it is a bishop's see, and has some fine old buildings, and some remains of Roman walls: 6, *Orense*, with a bishop's see and 4000 inhabitants, stands on the Miño, which is here crossed by a fine bridge; it has hot mineral waters, and is situated in a district abounding with good wine: 7, *Tuy*, also an episcopal town, stands on the right bank of the Miño, has 6000 inhabitants, and a fine cathedral: 8, *Vigo*, on the Bay of Vigo, which forms one of the largest and safest natural harbours in Spain, carries on a considerable trade with America, exporting wine, sardines, linen cloth, and stockings, and other articles of native industry; it has 6000 inhabitants, and is defended by two castles: 9, FERROL. *Pontevedra*, at the head of the Bay of Pontevedra, N. of Vigo, has a good harbour, some commercial industry, and 5000 inhabitants, who are largely engaged in the pilchard fisheries along the coast.

(Miñano, *Diccionario Geografico de España.*)

GALILEE. [PALESTINE.]

GALILEI, VINCENTIO, father of the illus-

trious Galileo Galilei, was born in the early half of the 16th century, and studied music under Zarlino. His chief work was 'Dialogo della Musica Antica e Moderna,' a folio volume, printed at Florence in 1581. He was an exquisite performer on the lute.

GALILE'I, GALILE'O, who is most commonly known under the latter, which was his Christian name, was the son of Vincentio Galilei. He was born at Pisa, in Tuscany, on the 15th of February, 1564.

Having acquired during his boyhood, and under adverse circumstances, the rudiments of classical and polite literature, he was placed by his father at the University of Pisa in his 19th year. Galileo was designed for the medical profession, but determined to renounce it in favour of geometry and experimental philosophy; to which his father reluctantly agreed.

His first important discovery was the isochronism of the vibrations of a simple pendulum sustained by a fixed point. This equality or near equality of the time of vibrations Galileo recognised by counting the corresponding number of his own pulsations.

Through the good offices of his old teacher Guido Ubaldi, who admired his talents and foresaw their future development, Galileo was introduced to the Grand-duke Ferdinand I. de' Medici, who appointed him mathematical lecturer at Pisa (1589), though at an inconsiderable salary. Here he commenced a series of experiments on motion, a subject on which his first inferences were not correct; but he had learned enough from his experimental course to perceive that most of the scholastic assumed laws of motion were untenable.

The mind of Galileo becoming thus unfettered from the chain of authority, he resolved to examine the rival systems of astronomy. He soon discovered and proved the futile nature of the objections then usually made against the Copernican system, which were founded on existing ignorance of the laws of mechanics, or on some misapplied quotations from Aristotle, the Bible, and the Fathers; and having also observed that many who had at first believed the Ptolemaic system had changed in favour of the Copernican, while none of those attached to the latter changed to the Ptolemaic hypothesis—that the Ptolemaic required almost daily some new emendation, that the appearance and disappearance of new stars contradicted the pretended incorruptibility of the heavenly bodies, together with other reflections which he has collected in his dialogues,—he became a convert to the Copernican system, and, in his old age, its most conspicuous martyr. So strong however were the religious prejudices on the subject of the quiescence of the earth, that Galileo thought it prudent to continue to lecture on the hypothesis of Ptolemy, until time should afford a favourable opportunity to destroy the visionary fabric by incontestable facts.

One of the false doctrines which he first combated was that bodies of unequal weights would fall through the same altitude in unequal times: thus, if one body were ten times as heavy as another, it should fall through 100 yards, while the lighter had only fallen through ten. But though the experiment was performed from the leaning tower at Pisa, and both bodies reached the ground at almost the same instant (the small difference, as Galileo rightly observed, being attributable to the unequal resistances of the air), the witnesses of this experiment were not convinced, so inveterately were they prejudiced in favour of the doctrines in which they had been taught to place implicit belief.

Instead of making converts by his experiments, Galileo discovered that he had made many secret and some open enemies; he therefore left Pisa, and removed to the University of Padua (1592), where he was appointed to a professor's chair for the limited period of six years. Here he invented an imperfect species of thermometer. His correspondence with Kepler commenced about the same period. A treatise on the Sphere, after the Ptolemaic system, which is attributed to Galileo, appeared about the same time. (Afterwards published at Rome, 1655.)

On his reappointment to the professorship at Padua, his salary was doubled, his fame increased, and his lectures were crowded; but these flattering events were overbalanced by a disagreeable intermittent disease to which he then first became subject, and which pursued him for the remainder of his life. A new star, almost as brilliant as that which directed Tycho Brahé's mind to the study of astronomy, having appeared in 1604 in the constellation of Ophiuchus, he made it the subject of his lectures.

He read and admired Gilbert's work 'On the Nature of Bodies,' adopted his views on the subject of terrestrial gravity, and constructed magnets after his example; about the same time he attacked with some bitterness one Capra, who ascribed to himself the invention of a species of compass with Galilei had made; and he wrote also on practical methods for the measurement of heights and distances. Shortly afterwards he states in a letter, that 'he intended hereafter to write three books on the system of the universe; three books on local motion; three books of mechanics; also on sound, speech, light, the tides, continuous quantity, animal motion, and castrametation; many of these works, it is supposed, were destroyed by his relatives after his death, at the instance of the family confessor.

The year 1609 was signalised by the construction of the Galilean telescope, which consisted of a plano-convex object-glass, and a plano-concave eye-glass, and thus he laid the foundation of his brilliant discoveries in the solar system. However the long-mooted question of the invention of this noble instrument of science may be decided, its application by Galileo to astronomy, for the first time, is indisputable. His first telescope was presented to the Doge of Venice, by whom the professorship of Padua was confirmed to him for life, with the greatest salary which had ever been there given to the mathematical professor, namely, about 1000 florins.

Galileo, impatient to obtain ocular evidence of what he called the structure of the universe, soon provided himself with a second instrument, and on

directing it towards the moon. this luminary became immediately stripped of the character of geometrical perfection, attributed to all the celestial bodies by the schoolmen.

The more obscure parts of the lunar surface, which they imagined had arisen from some earthly taint consequent on the proximity of the moon, being now rendered distinctly visible, taught Galileo that the surface of the moon was irregular and uneven. In pursuing these observations, he found that the moon turns towards the earth the same face constantly, so that nearly a hemisphere of her surface can never be visible to us. From this remarkable fact he does not appear to have drawn the inevitable consequence, that the time of her rotation round her own axis, and the time of a revolution round the earth, must be exactly equal. Galileo subsequently observed the librations of the moon, by which small portions of her more distant hemisphere are alternately brought in view. The idea which was suggested from the appearance of oceans and continents, mountains and valleys, on the moon, that she might be habitable, overwhelmed the schoolmen with horror, and struck the religious with alarm.

On examining the nebulæ, and particularly the Milky Way, with his glass, he perceived that they were composed of myriads of stars, or, in the language of Milton, 'powdered with stars.' It may be remarked in passing, that Milton visited Galileo, and entertained the highest opinion of his philosophy, to which he makes some beautiful allusions in his 'Paradise Lost.'

The planet Jupiter furnished matter for still greater wonder. Galileo perceived three very small stars eastward of the planet, and close to its disc; two of them, on a subsequent observation, had distinctly changed position to the westward; he soon perceived that they were satellites; and shortly afterwards he discovered the fourth. The strength which this discovery gave to the Copernican system, from the analogy with our moon, did not prevent his ever-active mind from perceiving its great practical importance in the question of determining longitudes at sea. The manner in which he was assailed after this discovery must have caused him amusement rather than chagrin: some would not look through his glass to be convinced; one Horky asserted that he had used the telescope, and that he saw nothing of the kind; one thought it odd that nature should give satellites to Jupiter for no purpose but to immortalise the Medici family (for Galileo had denominated them Medicean stars, in honour of his patron).

On examining Saturn with the telescope he perceived his ring, but, viewing it in perspective, he took the lateral portions for two small stars, which induced him to announce in transposed letters the following sentence:—

'Altissimum planetam tergeminum observavi.'
(The most distant planet I have observed to be threefold.)

His next discovery he also concealed in the same enigmatical manner; the transposed letters signify, in their proper order—

'Cynthiæ figuras æmulatur mater amorum;'
(Venus rivals the moon's phases;)

alluding to the crescent form of this planet when in or near conjunction. His discovery of spots on the sun's disc, which were evidently attached to that luminary, was a severe blow to the imaginary perfection of the schoolmen.

The Jesuits had always entertained a cordial hatred for Galileo, as he had joined the party by whom they had been expelled from Padua; the progress of his discoveries was therefore reported to the Inquisition at Rome as dangerous to religion, and he was openly denounced from the pulpit by Caccini, a friar. In his own justification he wrote letters, one to his pupil Castelli, and another to the Archduchess Christina, in which he repudiates any attack upon religion, and states that the object of the Scriptures was to teach men the way of salvation, and not to instruct them in astronomy, for the acquiring of which they were endowed with sufficient natural faculties. Nevertheless the Inquisition was implacable, and ordered Caccini to draw up depositions against Galileo; but his appearance in person at Rome in 1615, and his able defence of his conduct, for a moment silenced his persecutors and the proceeding dropped, but in what manner is not clearly stated.

In March 1616 the Pope (Paul V.) granted Galileo an audience, and assured him of his personal safety, but he was soon enjoined not to teach the Copernican doctrine of the motion of the earth: Galileo complied, and left Rome in disgust. He had soon occasion to turn his attention again to astronomy, for in 1618 there appeared no less than three comets, on which occurrence Galileo advised his friends not to conceive too hastily that comets are planets, moving through the immensity of space, but that they may be atmospheric; his reasons for this, though ingenious, are fallacious, as are those which he afterwards gave for the causes which produce tides, which he attributes to the unequal velocities of different parts of the sea by reason of the combination of the rotatory and progressive motions of the earth, which at some points conspire together, and at others are opposed. He afterwards went to Rome, and was received with great kindness by the next Pope (Urban VIII.): his enemies were silenced for awhile, and he was sent home to Tuscany loaded with favours and presents; and though his patron, Cosmo II. de' Medici, was dead, his successor, Ferdinand II., showed him strong marks of esteem and attachment.

In 1630 he finished, and in 1632 published his celebrated work, 'Dialogue on the Ptolemaic and Copernican Systems,' which he dedicated to Ferdinand II. By giving the work this form, his object seems to have been to evade his promise not to teach the Copernican doctrines. Three fictitious persons conduct the dialogue: Salviati, a Copernican; Sagredo, a banterer on the same side; and Simplicio, a Ptolemaist, who gets much the worst both by jokes and argument. The Pope, who had been personally friendly with Galileo, fancied (as indeed seems to have been the case) that he was the person held up to ridicule in the last character, as some arguments which he had used had been put into Simplicio's mouth; he was therefore mortally offended, and the Inquisition resolved not to allow the attempted evasion of

Galileo's solemn promise. Galileo was accordingly summoned to Rome, though he was 70 years of age and overwhelmed with infirmities; he had however all the protection and comforts which the grand-duke could confer on him, being kept at the Tuscan ambassador's house; and this spirited man (Nicolini) even wished to maintain him at his own expense when he perceived a penurious disposition in Ferdinand's minister.

After some months' residence in Rome, he was again summoned before the Inquisition, and on the 20th of June appeared before the assembled inquisitors in the Convent of Minerva. Here he was obliged to make his celebrated recantation of the Copernican doctrine.

Rising from his knees after this solemnity, he whispered to a friend, '*E pur se muove*,' 'It moves, for all that.'

Afflictions followed quickly the old age of Galileo. In April 1634 he lost a beloved daughter, who was his only stay. He was allowed to return to Arcetri, where she breathed her last, but he was still kept in strict confinement. After two years spent in this unhappy condition his confinement became more rigorous, through some new suspicions entertained by the Pope, so that, after having been allowed to remove to Florence for the benefit of his declining health, he was ordered to return to Arcetri. In 1636 he became totally blind; about which time he finished his 'Dialogues on Motion,' which were remarkable enough for the time or for any other man, though not perhaps commensurate with the high ideas associated with the name of Galileo; and, though he believed this work could not annoy the holy office, yet the terror was so great and universal that he could not get it published until some years afterwards, when it was undertaken at Amsterdam.

Amongst the most celebrated pupils of Galileo are Viviani and Torricelli, the former of whom in particular bore a strong attachment for his master. While Torricelli was arranging a continuation for the 'Dialogues on Motion,' Galileo was suddenly taken ill with a palpitation of the heart, and, having lingered two months, he died on the 8th of January, 1642.

He appears to have been of a sprightly temperament, easily crossed, and easily reconciled; his kindness to his relatives, which distinguished him from his childhood to old age, and which went frequently to such an extent as to embarrass himself, forms a noble trait in his domestic character; he was somewhat attached to the bottle, and was considered a good judge of wine; he contrived to have his son Vincentio legitimised, but afterwards had the misfortune to find his hopes in this lad disappointed. Galileo was also acknowledged to have an excellent taste for music, painting, and poetry, and the style of his 'Dialogues' is still much praised by his countrymen.

His works have been collected in 13 vols. 8vo., Milan, 1811; there have been also several other collections of the same, and they have been published in separate tracts.

Viviani, his disciple, wrote his life, and left a legacy to raise a monument to his memory. Newton was born one year after Galileo's death.

One of the best written biographies of Galileo that has yet appeared is by Mr. Drinkwater. (Bethune.)

That the whole proceeding before the Inquisition was disgraceful to the parties concerned is generally admitted even by Catholics; but the question, and one which has not been fairly handled by Protestants, is, how far those parties can claim to be the representatives of the church which declares itself infallible in matters of faith? The importance of Galileo's trial depends upon its connexion with this question.

That the Roman Church decided against the earth's motion has been generally affirmed by Protestants, and denied by Catholics, we believe with justice. But that the church which claims infallibility in essential matters suffered two local tribunals, the office of which was the suppression of heresy, to pronounce, and, as it turns out, to pronounce wrongly, upon a question of astronomical fact, is all but universally admitted. Nevertheless, even this is denied altogether by some defenders of the proceeding, whose account of the matter is as follows: — That Galileo, in 1615, not content with supporting the Copernican doctrine as a truth, which it was open to him to do, persisted in invading what himself admitted to be the prerogative of the church, by declaring that the sacred Scriptures could be interpreted against Ptolemy and for Copernicus; and this, in spite of many friendly warnings, that he must confine himself to 'demonstrating his system,' and writing 'as a mathematician, and by way of hypothesis.' That, when the first attempt was made upon him in 1615, as much licence as the above was distinctly mentioned as given to all. That the prohibition of 1616, to teach or write in favour of the Copernican doctrine, was a prohibition to Galileo only, not to others, and was brought about partly by Galileo's persisting in forcing the theological question upon the court, and partly by the imprudence of his advocate, Cardinal Orsini, in pressing the subject upon the Pope. That before this prohibition was given, on the occasion of Galileo's first personal appearance, the qualificators of the Inquisition, whose office it is to put the propositions bearing on the points at issue before the court, drew up the two famous theses, in which the doctrine of the earth's motion was called false and heretical. That when Galileo, in 1632, brought on the proceeding of 1633, not only by a breach of the prohibition, but by a sarcastic reference to it, and a caricature of the arguments of his friend and benefactor, the reigning Pope, these theses were merely cited in the preamble of the sentence, and are not there to be taken as anything but recapitulation. That the word heretical, in the proceedings of the Inquisition, is the *stylus curiæ*, and that even offences against morals or the public peace, apart from all doctrine, must be styled heretical, before that court can assume jurisdiction.

In the above are the following assertions: 1, that any one (except Galileo, restrained for his own misconduct) was at liberty to teach the earth's motion as true, provided he confined himself to philosophy, and let theology alone; 2, that the

Inquisition pronounced no opinion upon the truth of the doctrine; 3, that it pronounced no opinion upon the orthodoxy of the same. We deny each of these positions.

As to the first, there were, at that time, three modes of maintaining a theory. First, as a mathematical hypothesis, assuming it not as true, but as sufficient to explain phenomena, and leaving its truth or falsehood aside, or even implying the latter. Secondly, as a truth, but without any reference to the Scriptures: maintaining it by arguments, and implying that, if the Scriptures really assert the contrary, there must be something wrong in those arguments. but that, if the latter amount to demonstration, then the interpretation of the Scriptures must be wrong. Thirdly, as an absolute truth, confirmed by reason and Scripture both. In the article we are examining, the first and second of these modes are confounded: and it is thought that, when Galileo was warned of the third mode, and told to write 'as a mathematician and by way of hypothesis,' and to confine himself to 'demonstration,' he was left with permission to use the second mode. This is not correct, but the mistake is a natural one. Demonstration, as applied to physical hypothesis, meant only explanation; and it could be said that a false hypothesis might give true demonstration, that is, might be shown to be capable of accounting for phenomena. To learn how matters stood in the present case, we must look to the words of the authorities. Of these there were two, the Inquisition, which took cognisance of the acts of heretics, and the Congregation of the Index, which examined and censured their books. In one and the same year (1616) the former silenced Galileo, the latter condemned the great work of Copernicus, and the writings of his followers. The decree which condemns them calls the doctrine of the earth's motion 'false, and altogether contrary to Scripture.' In 1620, the same Cardinals of the Index, finding that the work of Copernicus could by slight alterations be made to speak the language of hypothesis, published the corrections under which they would allow it to be read. We put a few sentences of the work side by side with the alterations dictated by authority:—

Copernicus.	*Correction required*
This question (of the motion of the earth) is not yet settled, and is not to be despised by any means.	It matters nothing whether the earth be taken as the centre [remember that the word centre in those days implied immoveability] or not, as far as solving the phenomena of celestial motions is concerned.
Since then there is *nothing to hinder* the motion of the earth,	Since then *we assume* the motion of the earth,
On the triple motion of the earth (heading of a chapter).	On *the hypothesis* of the triple motion of the earth.
These three stars (the earth being one)	Omit these words, because the earth is not a star, as Copernicus makes it to be.

This surely will settle, in reasonable minds of all persuasions, the question how much is permitted to a person speaking as a mathematician, and by way of hypothesis. If Copernicus says the earth is a star [a word implying motion], the cardinals strike it out: if that it may be so, they alter it into a professed assumption for purposes of calculation.

Next, as to the assertion that the Inquisition pronounced no opinion on the truth of the doctrine. The two propositions, affirming both its falsehood and heresy, were drawn up, it is said, by the qualificators or qualifiers, inferior officers of the court, and not the court itself. But, in point of fact, it will be found that the qualifiers are only the assistants of the judges; and the voluntary adoption of their conclusions by the cardinals makes those cardinals themselves the responsible parties. But, further, it is not true that the final sentence of 1633 did no more than state the theses of the qualifiers as recapitulation of the proceedings of 1616.

Next, as to the question whether the Inquisition declared the doctrine heretical. That, as far as its authority extended, and in its own usual sense and meaning of the word, it did do so, is clear enough from what precedes. But, as may be supposed, a general word which belongs to an extensive system of law has many uses. The argument about the *stylus curiæ* seems to us unanswerable. In our Court of King's Bench, peaceful persons are adjudged to have done many things by force and arms, because the court, originally instituted for matters connected with the King's peace, had no other way of widening its jurisdiction for the relief of the subject, except by interpreting one class of injuries after another as acts of violence. The Inquisition, instituted for the suppression of heresy, and having no choice but to determine all causes sent before it by the Pope (as was that of Galileo), was compelled by its forms to consider every point with nominal reference to heresy and orthodoxy.

Nor was the decision understood at the time as declaring heresy in the sense since affirmed. On this point we can cite a most unwilling contemporary witness, Fromond of Louvain, whose 'Antaristarchus,' written against the motion of the earth, was published at Antwerp in 1631. Fromond, who wants to get all the condemnation that he can for his opponents, begins by citing Catholics who have expressed opinions on the subject: and it is remarkable how mild the censure is, even of those who wrote after the decree of the cardinals. Tanner says the opinion is 'condemned, and cannot any longer be safely held;' Mersenne, that 'any one may justly think it rash*, particu-

* This word rash, *temerarius*, is of great force. It had a technical meaning, and was constantly used at the time of which we write, as for aught we know it may be now, as an epithet distinctive of an offence minor to heresy. Accordingly, when a priest styles the opinion *rash*, it is to be inferred that he would refuse to say it was *heretical:* just as, hearing a lawyer call an offence manslaughter, we should suppose him to deny that it amounted to murder. So that, when Mersenne qualifies as only *temerarium* that which the court of which he is speaking had pronounced *falsum et formaliter hæreticum*, he limits the power of that court in the same manner as Fromond did, though more briefly.

larly after the manner in which the cardinals have expressed themselves.' The author goes on to state, with a slight, but very slight, tone of reproach, that there are men, both learned and Catholic, in Italy, France, Germany, and Belgium, who care little for the opinion of the cardinals, and who say that the power of these dignitaries is not supreme and pontifical, and that, until this last-named power is exerted, they are safe and not within the limits of heresy. But Fromond doubts whether they are 'safe enough.' He points out that the books which are in the Index are condemned (according to the bull of Sextus V., which modelled both the Index and the Inquisition into the form which they had when Galileo was silenced) by the authority of the Pope, expressly delegated for that purpose; and he then feels justified in drawing the following inference: 'If,' says he, 'the general opinion of the Catholics of our time be correct, namely, that the Pope speaking *è cathedra* cannot err, though not supported by a general council, then it is all up with Copernicus, and his paradox (to use a gentle word) appears rash, and next thing to heresy, ay, even more.' Having thus, as it were, made his utmost point, and still not got quite as far as heresy infallibly pronounced, he checks himself thus: 'This is what a severe judge might think. But, when I consider how circumspect and free from haste pontiffs generally are in their decrees on matters of faith *è cathedra*, and also their practice of making those decrees in their own names and not in those of others, and since Sextus V., in the diploma which established the fifteen congregations of cardinals, expressly says, "Of those decrees which relate to the dogmas of the faith, we reserve the interpretation to ourselves"—it seems necessary to mitigate the censure a little, and right to suppose that the authority of the Congregation of the Index is not equal, but inferior, to that of the Pope.' He ends by saying that, though the Copernican has (unless the Pope should otherwise decide) one foot inside the door of heresy, yet he would not dare to pronounce him an open heretic, without something more express from the head of the church.

But not only do Catholic writers thus express themselves, but contemporary Protestants, the most stanch opponents of Rome, accept the interpretation. Thus Bishop Wilkins, a decided Puritan, writing in 1640, after stating that some individuals, as Serrarius, expressly condemn the Copernican doctrine as a heresy, proceeds as follows:—'And since him, it hath bin called in [question?] by two Sessions of the Cardinals as being an opinion both absurd and dangerous. And therefore likewise doe they punish it, by casting the Defenders of it into the Pope's truest Purgatorie, the Inquisition: but yet neither these Councels, nor any (that I know of) since them, have proceeded to such a peremptorie censure of it as to conclude it a heresie; fearing, perhaps, lest a more exact examination, and the discoverie of future times, finding it to bee an undeniable truth, it might redound to the prejudice of their church, and its infallibilitie.'

It is moreover to be remembered that the Inquisition, and even the Congregation of the Index, was a local authority, incompetent to legislate for the faith of all Roman Christians.

Lastly, if we remember the controversy which has always existed in the Roman world as to the character of decrees emanating from the Roman see alone, without a general council, we shall see that it would have been very unlikely that a Pope should have raised this question in France, Spain, and Germany, upon a matter which might any day be settled against him by absolute demonstration.

GALIPE'A, a genus of rutaceous shrubby or arborescent plants, inhabiting the warmer parts of South America. The flowers are small, white or pink, often fragrant. The most remarkable species is the *Galipea* or *Bonplandia trifoliata*, which has also been called *Cusparia febrifuga*, and *Galipea cusparia*, a plant yielding Angostura Bark. It is found in the neighbourhood of Angostura on the Spanish Main. The genuine Angostura or Cusparia Bark is obtained from a species of this genus; but whether from the *Galipea cusparia*, as stated by Humboldt, or by a distinct species, *Galipea officinalis*, as asserted by Dr. Hancock, is not determined. Angostura Bark is obtained both from the stem and branches. The specimens from the stem are flat, from 2 to 3 lines thick, while those from the branches are often quilled, and from $\frac{1}{2}$ to 1 line thick. The pieces are sometimes from 6 to 15 inches, but more frequently only from 2 to 6 inches long, and from $\frac{1}{4}$ to 2 inches broad. Some specimens have the surface covered with a thick, fungus-like, whitish yellow or clay-coloured crust, which may be more or less easily scraped off, and beneath which is a yellowish red smooth bark, often exhibiting small cracks. Other specimens have this covering much thinner and closely adhering to the bark. The internal surface is generally smooth, of a tawny or reddish yellow colour.

The bark is easily broken, and the recent fracture is of a brownish red colour, smooth, with a resiny shining surface. The shining appearance is best seen when a transverse section is made with a sharp knife. The smell is disagreeable: the taste pleasantly bitter, warm, aromatic, and causing a flow of saliva. The powder has the colour of rhubarb. The infusion is of an orange-yellow colour; the decoction, a clear light brown.

Brandes thought that he had discovered an alkaloid, which he proposed to call Angosturin, but it has not been detected by subsequent chemists. This bark contains neither gallic acid nor tannin.

The true Angostura Bark is very liable to be confounded with the false, which possesses such poisonous properties, that very fatal consequences have resulted from the substitution of the one for the other. It is probable that the false is the bark of some species of South American strychnos, as it contains strychnia as well as brucia, two most potent alkaloids.

False Angostura Bark was first observed in 1804 by Dr. Rambuch, of Hamburg, by poisonous effects following the use of a decoction of the bark; and similar consequences having been ob-

served at Vienna, the Austrian government ordered all the Angostura Bark in the empire to be burnt, and interdicted its future importation.

Spurious Angostura Bark, in the dose of eight grains, killed a dog in two hours; ten grains killed a young dog in a few minutes. A very small glassful of an infusion endangered the life of an adult, while a dose of the decoction destroyed a child with acute suffering. Ether and laudanum seem to act as antidotes. The dread of similar casualties from the employment of the spurious instead of the genuine Angostura Bark has prevented the use of the latter to that extent which it merits. In the treatment of the bilious diarrhœa, frequent in damp autumns in this country, after proper evacuants, it is of the most decided utility. In common English cholera likewise, and slighter cases of Asiatic cholera, it is the most beneficial agent which can be resorted to. It is best given in the form of infusion, and may either be administered alone, or with the addition of dilute nitric acid and tincture of opium, which last may be discontinued after a few doses.

GA'LIUM, a genus of plants belonging to the natural order *Galiaceæ* or *Rubiaceæ*.

G. cruciatum, Crosswort, is a native of Europe, and is commonly found in Great Britain.

G. mollugo, Great Hedge-Bedstraw, or Wild Madder, is a native almost throughout Europe and the Caucasus, and is found in Britain. The flowers are white, and sometimes yellowish. The roots are creeping, and yield a red dye like the true madder, but of a brighter colour; they also have the property of colouring the bones of animals red that feed upon them. This plant has been extolled as an effectual cure for epilepsy.

G. tinctorium, the Dyer's Bedstraw, is a native of North America, in low marshy places, especially in Canada and Newfoundland; it is also found in the Straits of De Fuca.

G. palustre, a native of Great Britain, nearly resembles *G. tinctorium* when the leaves are more numerous than usual. It is said that from the roots of this plant the Indians extract the red dye with which they colour their feathers and the ornaments of their dress.

G. septentrionale, the Northern Bedstraw. The Cree women use the roots of this plant to dye red. It is a native of North America, about the lakes of Canada and the United States.

G. verum, Ladies' Bedstraw, or Cheese-Rennet. On loose sandy soils the flowers are sometimes solitary and the stems much more branched, but agreeing in other respects with this species. It is a native of Europe and Siberia, in meadows, woods, and among bushes, and is found in Britain very commonly in dry soils. The stalks and flowers of this plant have been used in the cheese counties for the purpose of curdling milk, and also for colouring it. Mathiolus says it produces an agreeable flavour, and makes the cheese 'eat sweeter.' The French formerly used to prescribe the flowers in hysteria and epilepsy. The roots afford a rich red dye, superior in colour to madder. It was grown at one time as a substitute for the true madder, *Rubia tinctorium*, but the roots are too small to render its culture profitable.

G. aparine, the common Goose-Grass, or Cleavers, is a native throughout the whole of Europe, north of Asia, and North America, in hedges, fields, and most cultivated places; it is plentiful in Great Britain. The expressed juice of this herb taken in doses of four ounces or a quarter of a pint night and morning, during several weeks, is said to be a very beneficial remedy in cutaneous disorders, and is believed by the country-people to be a purifier of the blood and an antiscorbutic. The seeds have a corneous albumen, and when roasted have been used instead of coffee. We are not aware that they have been analysed, but it is not improbable that they contain a principle similar to caffeine; and, if this be the case, they would form a valuable substitute for coffee. The roots of this species, like most of the genus, afford a rich red dye, and birds that feed on them have their bones tinged with the colour.

The roots of *G. tuberosum* are farinaceous, and in China are cultivated as a dietetic vegetable.

Don enumerates 164 species of Galium, which are distributed in every quarter of the world. The common name Bedstraw given to all the species, is from the verb to *strew*, anciently written *straw*. Before the introduction of modern luxuries beds were strewed with various herbs, and doubtless this was one used for that purpose.

GALIZIA, the north-eastern province of the Austrian dominions, lies between 47° 10′ and 50° 50′ N. lat., and 18° 54′ and 26° 37′ E. long. It includes the country formerly called the Buckowine, and is bounded N. by Cracow, Poland, and Russia; E. by Russia; S.E. by Moldavia; S. and S.W. by Transylvania and Hungary; and W. by Hungary and Silesia. The population is estimated at 4,797,243, of whom 2,055,566 are Roman Catholic, 2,347,322 of the Greek church, 28,128 Lutherans, 1892 Calvinists, 283,345 Jews, and 78,252 military.

Galizia spreads out, on the northern side of the Carpathian Mountains, into extensive plains: those mountains extend their arms deep into the kingdom, and rise in many instances to a height of 4000 to 7000 feet. The Buckowine is covered with offsets of the Carpathians, and is altogether a mountain region. The mountains are full of small lakes, and the plains and low lands consist chiefly of loam and sand.

The rivers of the western part of Galizia belong to the basin of the Vistula; and those of the eastern, to the basins of the Danube and the Dniester. The tributaries of the Vistula within the kingdom are chiefly the Danayez, the Poprad, the Wysloka, the Saan, and the Bug. The other principal rivers, besides the above and the Danube and Dniester, are the Pruth, the Sered, and the Moldava.

The climate of Galizia is colder than that of any other possession of Austria, in consequence of the proximity of the Carpathians. The summer is generally short, and the grape never ripens: the winter is very severe for six months at least. The country abounds in sandstone, granite, quartz, slate, potter's earth, yellow ochre, marble, gypsum, &c. Mountain crystals, agates, jaspers, ordinary opal, alabaster, &c., are found in several spots.

The Carpathians yield iron, gold, silver, lead, copper, sulphur, and salt.

The inhabitants are chiefly of Polish descent, located in the western provinces; the rest are Ruthenes or Russniaks, who inhabit the circles east of the Saan; Moldavians, in the Buckowine; Jews; and a mixed race of Germans, Hungarians, &c. The benevolent institutions are in considerable numbers. The educational establishments are in a backward state.

The government of Galizia is on the same footing as that of the other hereditary possessions of Austria. The highest authority in civil affairs is the Board of Provincial Administration at Lemberg, to which the whole nineteen circles of the kingdom are subordinate. The court of appeal and chief criminal court are in the same town, where also are the head-quarters of the commander-in-chief for Galizia.

Circles.	Area: Square Miles.	*Chief Towns, with Population of each.*
Wadovieze .	1372	Wadovieze, 2400; Biala, 4000.
Bochnia . .	1038	Bochnia, 4800; Wieliczka, 4550.
Sandecz . .	1197	Novy-Sandecz, 4500.
Tarnóf . .	1953	Tarnóf, 2260.
Yaslo . .	1269	Yaslo, 1770.
Rzezof . .	1680	Rzeszof, 4800.
Lemberg .	1025	Lemberg (capital of Galizia), 56,000.
Przemysl .	2058	Przemysl, 7550; Yaroslaf, 3400.
Sanok . .	2131	Sanok, 1800.
Sambor . .	2127	Sambor, 6800; Drohobycz, 3150.
Stry . . .	2064	Stry, 5700; Zydaczof, 2200.
Stanislavof .	1420	Stanislavof, 1900.
Kolomea. .	1183	Kolomea, 2200; Snyatyn, 6500.
Brzezan . .	2335	Brzezany, 5200; Rohatyn, 2760.
Zloczof . .	1896	Zloczof, 6150; Brody, 21,900.
Zolkief . .	2044	Zolkief, 4020.
Tarnopol .	1268	Tarnopol, 9500; Zbaracz, 5710.
Czortkof. .	1351	Zaleszczyki, 5560.
Czernovitz, formerly the Buckowine .	3097	Czernovitz, 6600; Suczava, 4890.
	32,508	

Agriculture is in a low state in Galizia. The farmers' waggons are rude and clumsy, his horses are never or seldom used at the plough, and he can scarcely afford to lay manure on his ground. The principal kinds of grain produced are wheat, rye, oats, and barley. Buckwheat, peas and beans, potatoes and other common vegetables, succory, clover, flax and hemp, tobacco, aniseed, rape and other seeds for making oil, a few hops, &c., are also grown. Tar and potash are made in considerable quantities.

Large droves of horned cattle are fed, the finest being brought from Moldavia. Something has been done towards improving the race of sheep, and Galizia now produces some fine wool. In the eastern districts much honey and wax are made; the red wax of the Buckowine is in great repute. The rivers, small lakes, and ponds are well supplied with fish. The bear, wolf, fox, beaver, roebuck, stag, lynx, marmot, eagle, vulture, swan, heron, wild goose, squirrel, and hare are the principal wild animals. The mining is chiefly confined to iron and salt; the other mineral products are raised in very small quantities. The manufactures are gradually extending, though they are still on a confined scale. The country-people in general make the materials for their clothing. The spinning and weaving of flax and hemp give employment to thousands. They manufacture very coarse and durable linen, and, in some parts, a few fine cloths, damask and table linen, &c. There are a few woollen and cotton manufactures; and there are also manufactures of paper, wooden utensils, brandy, tobacco, beet-root sugar, leather, a small quantity of hardware and earthenware goods, and a few ships and boats.

The foreign trade of Galizia is very limited. The exports consist of cattle, skins and hides, wool, grain, salt, timber, potash, aniseed, horses, &c.; and the imports, of raw materials, wines, and manufactured goods and colonial produce. There are no railways yet constructed, but one is in progress to connect Bochnia with Olmütz.

Previous to 1374, Galizia formed a part of Hungary. It was then incorporated with Poland; but in 1773 it was surrendered to Austria, and annexed to the Austrian dominions under the name of the Kingdom of Galizia and Lodomeria.

GALL, ST., THE CANTON OF, one of the cantons of the Swiss Confederation, situated at the north-east extremity of Switzerland, is bounded on the N. by Thurgau and the Lake of Constance; E. by the Vorarlberg; S. by the Grisons and Glarus; and W. by Schwyz and Zürich. Its area is reckoned at 780 square miles, and its population about 170,000. St. Gall is a new canton, which was formed at the beginning of the present century, by the union of the territories of the Abbot of St. Gall with the free town of St. Gall, and several districts formerly subject to the old cantons, namely, the Rheinthal, Sargans, Werdenberg, Utznach, Gaster, and Sax, and the town of Rapperschwyl. The spoken language of St. Gall is a dialect of the German, resembling the Swabian.

The canton of St. Gall is in great part a mountainous country, being intersected by various offsets of the Alps. The general slope of the surface is towards the north and north-west, the streams running in those directions. The principal rivers are the Rhine, the Seez, the Thur, the Sitter, the Goldach, the Tamina, and the Necker. The agricultural produce consists chiefly of wine, fruits in great abundance, corn, potatoes, and pastures. There are considerable forests, and much wood is exported. The domestic animals are oxen, sheep, goats, pigs, and horses. The rivers and lakes abound with fish and water-fowl. There are iron,

coal, and turf, in different parts of the canton. The manufactures of linen and cotton are considerable; there are also a few tanneries.

The canton is divided into fifteen districts: St. Gall, Tablat, Rorschach, Unter Rheinthal, Ober Rheinthal, Werdenberg, Sargans, Gaster, See Bezirk, Ober Toggenburg, Unter Toggenburg, Alt Toggenburg, Neu Toggenburg, Wyl, Gossau.

St. Gall, the capital of the canton, once a free imperial city, is situated in a pleasant valley, is well built, well supplied with water, and contains above 9000 inhabitants, of whom about 1300 are Roman Catholics. The principal buildings are—the old abbey church; the former convent, now a gymnasium; the casino, or assembly-room; the town-house; several hospitals and asylums; and the public granaries. St. Gall is one of the most commercial towns of Switzerland. Rapperschwyl is prettily situated on a peninsula projecting into the Lake of Zürich, with a bridge 4500 feet long; it has some manufactories, and about 1500 inhabitants. Altstätten, in the Upper Rheinthal, in the midst of a fertile country, is a place of some trade, with about 6000 inhabitants, including its commercial territory. Rheineck, in the Lower Rheinthal, on the left bank of the Rhine, has about 1400 inhabitants. The red wine made in the neighbourhood is among the best in Switzerland.

The government of St. Gall is one of the most democratic among the representative cantons of Switzerland: it approaches nearly to that of the landsgemeinde, or pure democracies, of the little cantons. The revenues are derived from the income-tax; licences for shops, public-houses, and sporting; stamp-duties; tolls; monopoly of salt; post-office, and national domains.

(Leresche, *Dictionnaire Géographique Statistique de la Suisse;* Walsh, *Voyage en Suisse;* Franscini; Dandolo.)

GALL, DR. FRANZ JOSEPH, the founder of the system of phrenology, was born at Tiefenbrunn, in Suabia, on the 9th of March, 1757. He seemed at a very early age to have evinced habits of accurate observation, for it is said that, when a boy at school, he often amused himself with remarking the differences of character and talent among those educated alike, among his brothers and sisters, and his playmates and schoolfellows. He saw, too, that these characters seldom changed — that education rarely altered the good or bad temper of a child, or gave the talent which he exhibited in one subject a direction towards another. He observed that the boys who were his most formidable competitors were all distinguishable by a peculiar expression of countenance, the result of unusual protrusion of the eyeball, which seemed to him a certain sign of talent. By constant and diligent observation he imagined that he found this peculiarity always associated with an aptitude for acquiring language, and that the size and shape of the head indicated the amount of power and the nature of individual talent. His mind was so completely engrossed with the pursuit of facts to support his belief that he should find a complete key to the human character, that his academic career was marked by no particular success, though his talents might certainly have secured it.

Being on terms of intimacy with Dr. Nord, physician to a lunatic asylum in Vienna, he carefully examined all the insane there, observing the peculiar character of the insanity in each, and the corresponding forms of their heads: he frequented prisons and courts of justice, and made notes of the crimes and appearance of all the prisoners. In short, wherever there was any person made remarkable by good or bad qualities, by ignorance or by talent, Dr. Gall lost no opportunity of making him a subject of his study. With the same views he was constant in his study of the heads and characters of both wild and domesticated animals. He had always felt sure that the form of the skull in itself alone could stand in no relation to the intellect or disposition, but it was not till late in his pursuit that he resorted to anatomy to confirm his views. Having obtained his diploma, he made it his care, as far as possible, to ask for leave to examine the brains of all whose characters and heads he had studied during life, and soon found that, as a general rule, the exterior of the skull corresponds in form with the brain contained within it.

At length, after unremitting exertion and constant study for upwards of twenty years, Dr. Gall delivered his first course of lectures, in 1796, at his house in Vienna. Supported by a vast accumulation of facts, he endeavoured to prove that the brain was the organ on which all external manifestations of the mind depended; that different portions of the brain were devoted to particular intellectual faculties or moral affections; that, *cæteris paribus*, these were developed in a degree proportioned to the size of the part on which they depended; and that, the external surface of the skull corresponding in form with the surface of the brain, the character of each individual was clearly discernible by an examination of his head.

A doctrine so new, and so subversive of all that had been previously taught in psychology, produced no little excitement. It was argued with all the ardour with which new doctrines are so generally assailed and defended; but Gall took little part in these disputes, and still continued to lecture and collect more facts.

He gained disciples daily, and in 1800 Dr. Spurzheim became his pupil. In 1804 this gentleman was associated with him in the study of his science, and to this event phrenology probably owes much of its clearness and popularity.

Soon after their association, Drs. Gall and Spurzheim commenced a tour through the principal towns in Germany and Switzerland, diffusing their doctrines, and collecting everywhere with the most assiduous industry fresh evidence in their favour. In 1807 they arrived at Paris, which became at once the field of their principal labours and of the most vehement discussion.

Dr. Gall continued in Paris till his death, which occurred on the 22nd of August, 1828. He had suffered for nearly two years previously from enlargement of the heart, which prevented him, except at intervals, from pursuing his lec-

tures, and at length produced a slight attack of paralysis, from which he never recovered. At the post-mortem examination his skull was found to be of at least twice the usual thickness, and there was a small tumour in the cerebellum.

Whatever may be the merits of the phrenological system, Dr. Gall must always be looked upon as one of the most remarkable men of his age. The leading features of his mind were originality and independence of thought, a habit of close observation, and the most invincible perseverance and industry. Nothing perhaps but a character like this in its founder, and the very popular and fascinating manners of his chief supporter, could have upheld the doctrine against the strong tide of rational opposition and of ridicule with which it was assailed. Whether the system be received or not, it will be granted that, both in the collection of psychological facts which they have formed and have published, and by the valuable contributions which they have made to the study of the structure of the brain, to which their later labours had been particularly directed, they have conferred very great benefits on medical science.

GALL. [Bile.]

GALL STONES. [Calculus.]

GALLAS. [Abyssinia.]

GALLATES. [Gallic Acid.]

GALLEON (*galen* in Spanish) was the name given to very large ships, with three or four decks, which the court of Spain used to send to the coasts of Mexico and Peru, to receive on board the gold and silver bullion extracted from the mines, and bring it to Spain.

GALLERY, in its most extended sense, is used synonymously with corridor. In England however it is understood to be either a long narrow passage-way, or an open space, generally longer than wide, raised above the floor of a building, and usually supported by columns. Such galleries are met with (among other places) in English churches, in some courts of justice, and in theatres. The long external wooden passage-ways, formed something like a balcony, such as are occasionally seen in old inns, are called galleries.

Gallery is also a name of distinction given to a room either on account of its extent and proportions, or to one or more rooms especially appropriated to pictures and other works of art, whence the term Gallery is extended to the collection itself, without any reference to the building. In architectural language a room can hardly be called a gallery unless its length be three times its width, though that length may be increased to any extent not out of keeping with the other apartments, as was generally the case in Elizabethan mansions. The height of galleries should be about the same as their width; or a little less or a little more, as the ceiling is flat or arched. A very long gallery will bear to be somewhat loftier than one of moderate length; but the height must not be such as to occasion the effect of narrowness, and produce the proportions of mere corridor. Very low proportions are characteristic of galleries of the Elizabethan period, which look quite depressed by their heavy flat ceilings.

There is hardly anything in the interior of a building which lends itself so readily to architectural effect as a gallery, by giving lengthened perspective and vista. And, when the gallery is formed into divisions, many fresh and rich combinations of form are obtainable. Thus at Holkham, in Norfolk, the seat of the Earl of Liecester, there is a singularly beautiful statue gallery, formed by two octagons and a centre, connected by open arches. One of the most novel and at the same time beautiful effects yet produced in this department is the Glyptotheca at the Colosseum in the Regent's Park, London, fitted up for public exhibition of sculpture. This forms a complete circle, and has a peristyle of Ionic columns.

GALLERY, in military mining, is a subterranean trench, or passage, leading to the place where the powder is deposited for the purpose of producing an explosion.

Of the galleries which appertain to a fortress, the principal one, denominated the magistral gallery, surrounds the place under its covered-way; and the entrances to it are in the counterscarp of the ditch. A second gallery, designated the envelope, is formed under the foot of the glacis, so as either wholly or partially to circumscribe the works; and galleries of communication under the glacis lead to it from the former gallery. Small galleries, sometimes called listeners, are also carried towards the country, from the envelope; in order, as the name implies, that the defenders in them may discover, by the sound, where the enemy's miner is at work.

The galleries of a fortress are at least six feet high and four wide, and are lined and vaulted with brickwork: they are, or should be, so disposed as to insure complete drainage: and means must be provided to afford them proper ventilation. At the places where the galleries of communication fall into the envelope are placed strong doors, with loop-holes through them, for musketry, in order to arrest the progress of an enemy, should he force an entrance into the envelope.

The galleries executed by the besiegers of a place are usually carried out from a shaft sunk vertically in the ground; and they are either parallel or inclined to the horizon, according to circumstances. When the soil is loose, the sides and roof are lined with planks. These galleries are usually four feet six inches high, and three feet wide; and when their length exceeds 150 feet, the air in them being unfit for respiration, it becomes necessary to ventilate them by bellows or otherwise.

GALLEY (*galère* in French, *galéra* in Italian and Spanish), a large-sized long and narrow vessel propelled by oars and sails, which was much in use in the Mediterranean until the end of the 18th century for coast navigation, and for making the shore in shallow water. The oars were a great advantage in the dead calms so frequent in the Mediterranean, until the introduction of the steamboat. The largest galleys were 166 feet long and about 32 wide, with 52 oars. The rowers, who were generally convicts or Turkish prisoners, with

chains to their feet, sat on benches on the deck. The ship carried a 24-pounder and two 8-pounders.

The Venetians had a sort of large galleys, with a very lofty poop, called 'Galeazza.'

GALLEY SLAVES (*galériens* in French, *galeotti* in Italian) is the name given to criminals condemned to hard labour, who formerly used to be employed as rowers on board the galleys, but now are employed chiefly in the docks and military harbours of France, Spain, and Italy.

GALLIA. [FRANCE.]

GALLIC ACID exists in most astringent vegetables, but principally in the gall-nut, and hence its name. When obtained from the plants, it appears as slender prismatic colourless crystals, the primary form of which is an oblique rhombic prism. The taste is slightly sour and astringent; the solution reddens litmus paper. When exposed to a temperature of above 250°, the crystals lose their water and effloresce.

Gallic acid combines with bases to form salts, which are termed *gallates*. Gallic acid in the form of tincture of galls is much employed as a chemical reagent. In its anhydrous state it consists of $C^7 H^3 O^5$.

GALLI'COLÆ, a family of hymenopterous insects, of the section *Pupivora*. Distinguishing characters:—Posterior wings having but one nervure; anterior wings with two brachial cells, a radial cell of a triangular form; two or three cubital cells, of which the second (where there are three) is very small, the third large and bounded by the apical margin of the wing; antennæ of equal thickness from the base to the apex (or with the latter portion slightly thickened), and consisting of from thirteen to fifteen joints. The males with one joint more to the antennæ than the females. Palpi long; the maxillary usually four-jointed, and the labial three. Ovipositor lodged in a groove on the under side of the body.

Latreille (Cuvier, *Règne Animal*) enumerates three genera belonging to this family—*Ibalia*, *Figites*, and *Cynips*. [GALLS.]

GALLIE'NUS, PUBLIUS LICINIUS, son of the Emperor Valerianus, was made Cæsar and colleague to his father A.D. 253. He defeated, in a great battle near Milan, the Alemanni and other northern tribes which had made an irruption into North Italy. He was also well informed in literature, and was both an orator and a poet. When Valerianus was taken prisoner by the Persians, A.D. 260, Gallienus was acknowledged as Augustus. He appears to have given himself up to debauchery and the company of profligate persons, neglecting the interests of the empire, and taking no steps to release his father from his captivity, in which he died. The barbarians attacked the empire on every side, and revolts broke out in various provinces, where several commanders assumed the title of emperor, whilst Gallienus was enjoying himself at Rome. Now and then he seemed to awaken from his torpor at the news of the advance of the invaders, and, putting himself at the head of the legions, he defeated Ingenuus, who had usurped the imperial title in Illyricum. But he disgraced his victory by horrible cruelties. Meantime Probus, Aurelianus, and other able commanders, were supporting the honour of the Roman arms in the east, where Odenatus, prince of Palmyra, acted as a useful ally of the Romans against the Persians. Usurpers arose in Egypt, in the Gauls, in Thrace, in almost every province of the empire; from which circumstance this period has been styled the reign of the thirty tyrants. At last Aureolus, a man of obscure birth, but a brave soldier, was proclaimed emperor by the troops in Illyricum, entered Italy, took possession of Milan, and even marched against Rome while Gallienus was absent. Gallienus returned quickly, repulsed Aureolus, and defeated him in a great battle near the Adda, after which the usurper shut himself up in Milan, where he was besieged by Gallienus; but during the siege the emperor was murdered by some conspirators, A.D. 268. He was succeeded by Claudius II. Trebellius Pollio has written a history of the reign of Gallienus.

GALLI'NÆ, *Gallinaceous Birds*, the fifth order of the class *Aves*, according to Linnæus, who thus characterises it: Bill (a reaping sickle, *harpa colligens*) convex; the upper mandible arched over the lower; nostrils, overarched by a cartilaginous membrane. Feet formed for running, the toes rough below. Body sebaceous, muscular, delicate. Food, grain collected on the earth and macerated in the crop (*ingluvies*). Nest artless and placed on the ground; eggs numerous. Food pointed out to the young by their parent. Polygamous.

GALLINSECTA, Latreille (*Coccidæ*, Leach), a family of insects placed by Latreille and others at the end of the *Homoptera*. These insects apparently have but one joint to the tarsi, which are each furnished with only a single claw. The males are destitute of a rostrum, but furnished with two wings lying horizontally on the body. Females apterous, but provided with a rostrum. Antennæ filiform or setaceous. Apex of the abdomen furnished with two setæ.

The insects of this family live upon trees and plants. They are of small size, and in the larva state present the appearance of oval or round scales, attached to the bark or surface of the plant they inhabit, no distinct organs being apparent externally. In due time this larva, still attached, assumes the pupa state, and from this the perfect insect ultimately emerges.

In the spring time the body of the female becomes greatly enlarged, and more or less spherical. At this time impregnation takes place, after which she deposits her eggs, which are very numerous. In some species the eggs are deposited by the female beneath her own body, after which she dies, when the body dries, hardens, and forms a scale-like covering, which serves to protect the eggs until the following season, when they hatch. In other species, the females cover their eggs with a white cotton-like substance, which answers the same end.

Upwards of 30 species of *Coccidæ* are enumerated in Mr. Stephens's 'Catalogue of British Insects,' some of which most probably have been introduced into our island with the plants to which they are attached.

It is to the *Coccidæ* that we are indebted for a

beautiful dye, and also for the substance called *Lac*.

Several European species, as the *Coccus Ilicis* of southern Europe, and the *Coccus Polonicus*, yield a crimson dye, that of the latter being much employed in Turkey (see Kirby and Spence, 'Introduction to Entomology,' vol. i. p. 319, 320); but COCHINEAL is the produce of a species, *Coccus Cacti*, which is extensively reared in Mexico, plantations of a kind of Indian fig being cultivated for the breeding of it.

It is from an Indian species, *Coccus Lacca*, that lac is procured:—'When the females of this Coccus have fixed themselves to a part of the branch of the trees on which they feed (*Ficus religiosa* and *Indica*, *Butea frondosa*, and *Rhamnus jujuba*), a pellucid and glutinous substance begins to exude from the margins of the body, and in the end covers the whole insect with a cell of this substance, which when hardened by exposure to the air becomes lac. So numerous are these insects, and so closely crowded together, that they often entirely cover a branch; and the groups take different shapes, as squares, hexagons, &c., according to the space left round the insect which first began to form its cell. Under these cells the females deposit their eggs, which after a certain period are hatched, and the young ones eat their way out.'

(Kirby and Spence, vol. iv. p. 142.)

GALLIOT, a strong-built flat-bottomed vessel of a peculiar construction, used as a bomb-ship to fire against forts or batteries on the coast. Galliot is also a kind of small galley or large felucca, used chiefly in the Mediterranean. The Dutch, Swedes, and other northern nations have a sort of merchant-ship which they call Galliot, rounded both fore and aft, heavy, and clumsily built, but strongly timbered, and of the burthen of from 200 to 300 tons.

GALLI'POLI, the ancient *Callipolis*, a seaport town of Turkey, is situated on a peninsula at the north-eastern extremity and on the European side of the Strait of Dardanelles, and lies nearly opposite to Lampsaki, the ancient Lampsacus, on the Asiatic side of the channel. It occupies a considerable space, but the streets are ill built and dirty; the bazaars however are extensive and well supplied. This town has belonged to the Turks since 1357. It has two harbours, in which the imperial fleets frequently lie at anchor. The population, consisting of Turks, Greeks, Armenians, and Jews, amounts to 80,000. Its trade consists in corn, wine, and oil. There are several ancient remains in the town and neighbourhood, the most remarkable of which are the magazine and cellars built by Justinian, and the tumuli to the south of the city, which are said to be the tombs of the ancient Thracian kings. The only defence of the town is the old square castle and tower, built by Bajazet. Several foreign consuls reside in this place.

GALLIPOLI. [OTRANTO, TERRA DI.]

GALLON, an old English measure of capacity. Distinct gallons for wine, ale and beer, and corn and dry goods, continued in use until the Act of 5 Geo. IV., c. 74, which came into operation May 1, 1825. By statutes of 1689 and 1697, the wine gallon was declared to contain 231 cubic inches. The ale gallon was measured in 1700 or thereabouts, and found to contain 282 cubic inches. The corn gallon was thought, in the middle of the last century, to contain exactly 272¾ cubic inches: but the statute of 1697, which declares that a round corn-bushel must be 8 inches deep and 18½ inches wide, had in fact fixed the gallon at 268$\frac{6}{10}$ cubic inches. The imperial gallon, as settled by the Act of Geo. IV., is to contain 10 pounds avoirdupois of distilled water, of which it is declared that 252.458 grains fill a cubic inch: consequently the imperial gallon contains 277.274 cubic inches.

GALLOWAY (called by the Latin writers of the middle ages *Gallovidia*) is an extensive district in the south-west of Scotland, comprising Wigtonshire and the stewartry of Kirkcudbright, and part of Ayrshire and Lanarkshire. It is bounded by the sea, the Solway Frith, and the river Nith, and is divided into Upper and Lower Galloway. At the south-western extremity is the promontory called the Mull of Galloway. The general appearance of the district is rugged and mountainous, producing little else than pasturage for sheep and cattle, which are bred in large numbers, principally for the supply of the English market. The small horses known by the name of Galloways are also bred here.

GALLS are the result of a morbid action excited in the leaf-buds of several species of the genus *Quercus*, or oak, occasioned by an insect, *Cynips quercus*, depositing its ova in the bud. Such buds, instead of elongating and becoming branches, undergo a peculiar transformation, and enlarge into a globular figure, so as to constitute a fit nidus for the future larva.

The galls of commerce are chiefly those which occur on the *Quercus infectoria* (Olivier). They vary in size, from that of a pea to that of a nutmeg. The surface has irregular elevations or lines, with the interspaces generally smooth. The colour is white or yellow in one variety; green, gray, or black, in another. The white variety, which is the largest, often has a hole in the substance of the shell, by which the larva has escaped. This kind is the least powerful and least esteemed. The best galls come from Aleppo and Smyrna, but are often mixed with those from Syria and Cyprus.

The infusion possesses all the valuable properties of the gall, as does an alcoholic tincture; but decoction is an objectionable preparation. For internal use the infusion is preferable to the powder. Galls may be employed in powder to form an ointment, which with opium and camphor is of great service in painful hæmorrhoids. As a tonic in intermittent fever, and as an astringent in hæmorrhagic or other discharges, galls are occasionally employed. But the most extensive use is made of them in the arts, and as a chemical test.

GALLUS, C. AQUILIUS, was a Roman eques and a friend of Cicero. He was prætor B.C. 66. Gallus was a pupil of Q. Mucius Scævola, the Pontifex, and obtained a great reputation as a jurist. The distinguished jurist Servius Sulpicius was a pupil of Gallus, and either edited his works or incorporated them in his own writings. Gallus was the author of an edictal rule or formula

as to dolus malus (fraud) in matters of buying and selling, which he promulgated as prætor. (Cic. 'De Officiis,' iii. 14; Dig. 9, tit. 2.) The high opinion which Cicero entertained of his friend Gallus is expressed in his oration 'Pro A. Cæcina' (c. 27), where he pronounces upon him a eulogium which few lawyers have merited: 'The authority of such a man can never have too much weight, whose judgment the Roman people have seen tried in providing security against fraud, not in showing how fraud may be practised; a man who never separated the principles of law (jus civile) from those of equity, who for so many years dedicated his genius, his industry, and his integrity to the Roman people, which integrity was ever ready and ever at command; who is so great and good a man that he seems to have been formed a lawyer by nature, and not by education; so skilful and so learned, that not knowledge only but goodness too appears to be the product of the law: whose genius is so powerful, whose integrity so manifest, that whatever you draw from that source you will find to be pure and clear.'

GALLUS, AELIUS, a contemporary of Cicero, and a learned jurist, wrote a treatise on the signification of terms (Gellius, x. 22), from which a single excerpt is given in the Digest (50, tit. 16, s. 157).

GALLUS, JULIUS AQUILA, or Julius Gallus Aquila, a jurist under the empire, of uncertain date. There are two excerpts in the Digest from his 'Liber Responsorum' (26, tit. 7, s. 34, and 26, tit. 10, s. 12).

GALT, JOHN, was born at Irvine, in Ayrshire, May 2, 1779. His father was a sea-captain in the West India trade. About the eleventh year of his age his parents removed to Greenock; and there he was educated for commercial pursuits. He acted some time as a clerk in the custom-house, then entered a counting-house, and next removed to London, when he was between twenty and twenty-five years old. He commenced his literary career by a poem, the 'Battle of Largs,' published in portions in the 'Scots' Magazine,' and completed in 1804. Having entered into business, he and his partner quarrelled, and became bankrupts. A similar attempt with his brother was soon given up, and he entered at Lincoln's Inn, to study for the bar. In 1809 he went abroad, and travelled for three years. He published the results in two volumes. Soon after his return he married the daughter of Dr. Tilloch, the proprietor of the 'Star' newspaper, upon which Mr. Galt was employed; and he also wrote some works of history, biography, a volume of tragedies, &c., and at the same time engaged in commercial and other transactions. It was not till the publication of the 'Ayrshire Legatees' that his literary strength became apparent, by the delineation of familiar Scottish life in an inimitable vein of quaint, shrewd, homely, observant humour.

Mr. Galt's character for shrewdness and activity in business now opened great prospects. He was employed by the Canadians in the prosecution of their claims for losses during the war with the United States. Government agreed to Mr. Galt's proposal to sell lands to defray those claims; and the Canada Company, incorporated in 1826, undertook to buy and colonise the lands. Mr. Galt was one of the government commissioners who valued the land, and was afterwards employed by the Company as their superintendent.

Under his direction were founded the earliest of those settlements which are now acquiring so much importance: Guelph was entirely a place of his making; and the village of Galt received its name from him. But he offended the colonial authorities, and was not, it is said, sufficiently cautious in his commercial operations; alarm was excited about the Company's affairs, and the directors superseded him. He returned to England in 1829, after a residence in Canada of about two years and a half. Soon afterwards he took the benefit of the Insolvent Debtors' Act.

Literature, and for a short period the editorship of the 'Courier' newspaper, occupied the remainder of his life, which was a very melancholy one. After midsummer 1832 he was a confirmed invalid. He still continued however to 'wrench life from famine,' as he said, until his death, April 11, 1839. He was the author of twenty-four novels, of almost as many plays, of a still larger number of biographical and miscellaneous works, independent of all his periodical contributions. Much information about his life and writings is given in 'The Autobiography of John Galt,' 2 vols. 8vo., 1833; and 'The Literary Life and Miscellanies of John Galt,' 3 vols. 12mo., 1834.

GALVA'NI, ALOYSIUS (Lewis), was descended from a respectable family of Bologna, which had produced several distinguished men of letters. He was born in that town in 1737, and studied in its university. The degree of M.D. was conferred on him in 1762, and he received the appointment of Lecturer on Medicine at the Institute of his native town. In the 'Memoirs' of this body we find contributions on various medical subjects by Galvani. He also published separately 'Observations on the Urinary Organs,' and 'On the Organs of Hearing in Birds;' but an accidental circumstance introduced him to a novel subject which excited deep attention throughout Europe, and gave birth to a new and fruitful branch of physics, which yet retains in all countries the name of its first observer.

During his temporary absence, his wife, who was about to prepare some soup from frogs, having taken off their skins, laid them on a table near the conductor of an electrical machine which had been recently charged. She was much surprised, upon touching them with the scalpel (which must have received a spark from the machine), to observe the muscles of the frogs strongly convulsed: she acquainted him with the facts upon his return; Galvani repeated the experiment; and, having varied it in several ways, he was led to conclude that there existed an animal electricity both in nerve and muscles, and, some future experiments appearing favourable to that erroneous inference, he seems to have clung to that opinion during the remainder of his life, notwithstanding the experiments of Volta and others, which showed at least

that the moisture on the surface of the frog acted as a conductor.

The work in which Galvani developed his views relative to this new class of phenomena was published, in 1791, under the title 'Aloysii Galvani de Viribus Electricitatis in Motu Musculari Commentarius,' in which he infers that the bodies of animals possess a peculiar kind of electricity, by which motion is communicated by nerve to muscle, and in these experiments he regarded the metals as acting only as conductors between these substances, which he thought accounted for the observed contractions of the muscle, in the same manner that the dissimilar electricities on the interior and exterior surfaces of a Leyden jar reunite with explosion through a metallic conductor. In 1797 Galvani made a voyage along the shores of the Adriatic, for the purpose of confirming his notions on animal electricity by experiments on the Gymnotus, from which he concluded that the brain contributed to produce the observed effects. During the occupation of Italy by the French, he was expelled from the offices which he held, because he refused the prescribed oaths, when Bologna formed a part of the Cisalpine Republic. He died in 1798.

GALVANISM. This department of electricity takes its name from Galvani; but its infant progress was due in a much greater degree to his contemporary Volta, by whom piles were first constructed for increasing the intensity of the electricity produced by a single pair of plates. The production of electricity in this case arises from the action of the acid in the cell between two plates of dissimilar metals, that which is the more oxidable giving out positive electricity, as explained under ELECTRO-DYNAMICS. The forms in which the piles have been constructed are various, and the number of plates is adapted either to the quantity or intensity of electricity which may be desired. When a quantity with a feeble tension is requisite, a single pair of plates, such as zinc and copper, with extensive surfaces, separated by very dilute acid, will answer; but with a system of pairs of plates, where the copper of the first pair *conducts* its electricity to the zinc of the second, and so on, the quantity and intensity are increased with the number of the plates. In some constructions, as Ritter's dry piles, the plates are simply laid on each other, those of each pair being separated by moistened paper; in others the plates lie parallel in a trough of baked wood, by which means the cells are easily filled and emptied. In the *couronne des tasses* of Volta, the plates are placed circularly or in a bowl shape; while in Hare's Calorimotor there is merely one zinc plate and one copper twisted into a great number of coils. This construction has been much employed by Pepys, Faraday, and others. Mr. Grove ascertained the fact that two non-conducting solids may form the elements of a voltaic battery by suspending phosphorus in nitrogen in one tube of a gas-battery (described in the Philosophical Transactions, 1843), and iodine in nitrogen in another; a current was the result, which continued for months. ('Phil. Trans.,' 1845.)

The electricity produced by a galvanic battery is of the same nature as that given by the common machine, the only difference being that the mode of producing galvanism is continuous, that is, when in any way discharged, it is immediately reproduced by the oxidation of the zinc; and hence many galvanic phenomena have been successfully imitated by a series of sparks of ordinary electricity. When the positive and negative wires are made strictly to communicate by metallic conductors, the combination of the opposite electricities causes all phenomena analogous to those produced by the ordinary machine to cease, but gives birth to the electro-dynamic and electro-magnetic phenomena. [ELECTRO-MAGNETISM.] But when the wires from the opposite poles of the battery are only brought sufficiently near that the current may pass through an interposed substance, or when the circuit is completed by imperfect conductors, the physical changes which the interposed substances undergo constitute the phenomena of galvanism.

The deflagration of metals is effected by beating them into thin leaves, which are then interposed between the extremities of the positive and negative wires of the battery, brought within a quarter of an inch of each other: they will then burn with a beautiful light, but which is of different colours in different metals. Thus—zinc gives a white light with a reddish border; copper, a blueish white light, and throws out red sparks; lead, a purple light; gold leaf, a beautiful white light tinged with blue.

But if the interposed substances, instead of being laminæ, be of small irregular forms, or wire shaped, their temperature rises rapidly as the electric current permeates them. Steel burns, iron wire dissolves in globules, while charcoal produces a light of such dazzling brilliancy as to fatigue the eye. Ether, alcohol, &c., may be inflamed, and gunpowder exploded, by making the discharge through charcoal points.

The decomposition of water by the battery is effected by bringing the points of the positive and negative wires very near each other under water, inverted glasses being placed over them to collect the gases which are evolved. If the wires be not oxidable, then oxygen gas will be formed at the extremity of the positive wire, and hydrogen at the negative, in the same proportions in which they constitute that liquid; but, if oxidable, then the positive wire will be covered with an oxide, while the negative wire still produces hydrogen gas.

It may be observed generally, with respect to chemical decompositions effected by galvanism, that it is quantity rather than intensity which is requisite, and that the metals, alkalies, and earthy bases are transferred to the negative pole; the acids, oxides, and chlorides, to the positive. By the successive labours of Davy, Wollaston, Brande, Gay-Lussac, Berzelius, &c., different substances which had before been supposed simple, as soda, potash, lime, barytes, strontytes, magnesia, zircon, &c., were analysed by this powerful instrument; and though silex, alumina, &c., offered great resistance to its application, and the metallic bases were with difficulty restrained from again com-

bining with oxygen, still in the majority of cases the analysis has been successful.

An interesting class of experiments is due to Mr. Crosse on the employment of electricity, in a state of high tension, to form mineral and other substances. There is a cavern near Broomfield, of which the vault is covered with arragonite and carbonate of lime and fine crystals. The water which drips from this vault holds in solution ten grains of carbonate of lime and a little sulphate of the same to each pint. A glass filled with this water was submitted to the action of a battery consisting of 200 pairs of plates, and at the expiration of ten days the negative pole was found to have formed rhomboidal crystals of carbonate of lime, accompanied by some gas-bubbles, and in less than a month after the wire was covered with regular and irregular crystals, whence it follows that the bicarbonate was decomposed into carbonate and carbonic acid gas. In his varied experiments of this nature he has succeeded in forming, by means of the galvanic battery, the following minerals:—carbonate of lime; arragonite; quartz; protoxide of copper; arseniate of copper, and its blue and green carbonates; phosphate of copper; carbonate of lead; chalcedony, &c.

In order that an individual may receive a shock from a galvanic battery, it is advisable to moisten the hand, because the dry cuticle is a bad conductor of electricity: then, on touching one of the wires of the battery with a metallic rod, the shock will be received and felt in the wrists, arms, or shoulders, according to the intensity of the current; or a continued sensation, resembling the piercing of a very fine needle, will be perceived by dipping the finger in a dish containing a little water in which the wires of the battery are inserted in the same line with the finger. In both cases, if the nerves are denuded by a cut, the sensation is painful, and the pain will remain some time before it subsides.

When the battery is applied to a nerve of a person recently dead, and the circuit is completed, several violent motions ensue, dependent on the relative position of the nerve and muscle: thus, when the wire communicates with the phrenic nerve, the muscles of respiration are set in motion; when from the ulnar nerve to the spinal marrow is included in the circuit, the fingers are set in quick motion, and so on. Fishes are still more susceptible of this electric action than animals, and strong convulsive motions will be exhibited by a live flounder placed on a zinc dish and having a piece of copper or silver on its back, as soon as the two metals come in contact: similar effects take place with leeches, worms, and amphibious animals.

It was thought by Volta that the involuntary muscles, such as the heart, could not be thus excited, but experiment has decided against him.

P. Santi Linari drew the electric spark from the gymnotus in the following manner:—He took a glass tube of the shape of a capital U, which he partly filled with mercury; at each end was fixed an iron wire through a wooden button, and which reached very near the mercury. The apparatus being fixed with mastic on varnished wood, the end of the wires were made to touch short platina wires terminated by laminæ of the same metal, intended to make a good communication with the different parts of the electrical fish. When the circuit was formed, a spark visible even in the daylight appeared at the place where the conductors were interrupted. This experiment he has repeated in different forms. ('Biblioth. Univ. de Genève.')

M. Delarive has noticed a remarkable difference of effects in the action of Voltaic and of magneto-electric currents. When the wires of the latter were used for decompositions, but in the form of thin leaves or laminæ, there was but little disengagement of gas, and the more the lamina was plunged, the less was the gas evolved, which was not the case in the common form of the wire: this does not occur in Voltaic electricity.

Galvanism, in its action on the human system, resembles electricity, but it is distinguished from it by certain peculiarities. In its application it can be rendered more continuous and uniform, and may, like electricity, be administered, either in shocks, or in a regular flow of galvanic influence through the body. The most common form of administering it is by the electro-magnetic apparatus, through which it may be applied to the whole or parts of the human body. The action of galvanism on the human body is chiefly manifested through the nervous system, and it is in cases where this system is deranged that it is of most use as a medicinal agent. In functional paralysis, in atony of the muscles, in tetanus, in some forms of gastric and uterine diseases, the galvanic current has been found of great service.

(*Phil. Trans.*, 1815, 1834, 1843, &c.; Thomson's *Annals*, vi.; Wilkinson's *Galvanism*; Nicholson's *Journal*; *Edinburgh Med. Journal*; *Annales de Chimie*; *Journal de Physique*, 64; Puffendorf, *Annalen*; Becquerel, *Traité Experimental*; Pouillet, *Physique*; *Reports of the British Association*, &c.)

GALVANOMETER, or MULTIPLIER, is an instrument constructed for the purpose of detecting the presence of feeble electro-chemical currents.

The principle of the construction depends on the property possessed by electrical currents of acting on magnetised needles; for, if the conducting wire be placed on the magnetic meridian above or below the needle, the latter will suffer a deviation to the right or left according to the direction of the current.

The action of terrestrial magnetism tending to restore the needle, after its derangement by the current, to its original position, is almost entirely corrected by employing two similar needles supported parallel to each other by a light piece of straw or other substance, and placed with the poles of one in an inverse position to those of the other. This apparatus, being suspended by a fine silk thread, is placed in a wooden box of the form of a parallelopiped of small width, round which the conducting wire is passed in a great number of coils, which are kept from communicating by being doubly wrapped in silk or other non-conducting substance; the number of coils in some

such instruments has been more than 500, by which the effect produced on the needle by a single current is multiplied twice as many times, since the opposite sides of each coil double the action of either side.

GALWAY, a county of Ireland, in the province of Connaught, is bounded W. by the Atlantic Ocean; E. by King's County and Tipperary; N. by Mayo; N.E. by Roscommon; and S. by Clare and Galway Bay. It extends from 52° 57′ to 53° 42′ N. lat., and from 7° 53′ to 10° 15′ W. long. The greatest length, E. to W. is about 164 miles, and the greatest breadth, N. to S., 52 miles. The area is 2447 square miles, or 1,566,354 acres, of which 742,805 are arable, 708,000 uncultivated, 23,718 in plantations, 1801 in towns, and 90,030 under water. The population in 1841 was 422,923, of whom 403,746 were in the rural district, and 19,177 in the civic district.

The greater part of Galway is comparatively flat, and much of it encumbered with bogs. Lough Corrib, which divides the county into the east and west districts, is 30 feet above the level of the sea, and occupies an area of 43,485 acres. Lough Derg is an expansion of the Shannon, and forms part of the south-western boundary of the county. The whole district west of Lough Corrib and Lough Mask is known by the general name of Connamara, and has of late years attracted much attention by its capabilities of improvement, as well as by the uncommon wildness and beauty of its scenery. The Bay of Galway bounds it on the south, and the Atlantic on the west. The district is about 40 miles long by 30 broad. It has many conical mountains and many small lakes. Although this entire tract of country is generally known by the name of Connamara, it is properly divided into three districts: Joyce County, Iar-Connaught or Western Connaught, and Connamara Proper. The islands off the coast of Galway are very numerous; the chief are the three islands of Arran, lying about midway between the coasts of Iar-Connaught and Clare, in the opening of the Bay of Galway. Inishmore, or Arranmore, the largest of these islands, is about 7 miles long by 2 broad, and contains a population of 2592; the other two, Inismain and Inishere, are much smaller. Along the same coast are the islands of Innisturk, Innisboffin, and Innishark.

On the southern side of the Bay of Galway the coast is not favourable for the construction of harbours. Westward however from Galway, and round the entire coast of Iar-Connaught and Connamara to the boundary of Mayo, there is a succession of harbours for vessels of the largest class, unequalled perhaps on any similar extent of coast in Europe. These harbours are at Galway, Costello Bay, Casheen Bay, Greatman's Bay, Kilkerran Bay, Birterbuy Bay, Roundstone Harbour, Mannin Bay, Clifden Bay, Cleggan Roadstead, Ballynakill Harbour, and Killeries Bay. Some of these harbours have piers or jetties. On the whole, there is no part of this district more than four miles from existing means of navigation. The harbours fit for vessels of any burthen are upwards of twenty in number. There are twenty-five navigable lakes of a mile or more in length, and hundreds of smaller size. Lough Corrib and Lough Mask alone have upwards of seventy miles of navigable coast; and all these waters abound with fish. The sea-shore affords a constant supply of red and black sea-weed, which can be used either as manure or in the manufacture of kelp. Banks of calcareous sand and beds of limestone are of frequent occurrence, and there is an inexhaustible supply of peat fuel and of water power.

The rivers of Galway, being either feeders of the Suck and Shannon, or descending by short courses from the western district to the sea, are in general small. The chief among them are the rivers of Clare-Galway and of Shruel. There are several periodical or intermittent lakes and streams, owing to the porous nature of the limestone rock which forms the substratum.

The attempts made to improve the fisheries on the coast of Galway have been beneficial to the county generally; and roads have been gradually formed from the interior to the coast. There is an extension of the Grand Canal from Shannon Harbour to Ballinasloe. There is no railway yet in Galway; but an extension of the Irish Great Western from Mullingar is under consideration.

The climate is mild, and snow rarely lies in the western district. Cattle in this part of the county are never housed. The summers are wet, and the coast is exposed to very heavy storms from the Atlantic. In respect to geology, the eastern part of the county, with the exception of a portion of the sandstone and clay-slate formation of the Slieve Boughta range, which it includes, and of the range of the Slieve Dert Hills, on the borders of Roscommon, is understood to consist almost wholly of the same flœtz limestone tract which extends over the central plain of Ireland. The district west of Lough Corrib and Lough Mask is mostly of primitive formation. The mountains of the primitive district are highly metalliferous. Copper, lead, iron, and manganese are met with; and there are also abundant quarries of black, green, and variegated marbles, millstone grit, yellow ochre, and potter's clay.

The richest soil in this county occurs in a tract extending from Gort through Loughrea to Portumna, Eyre Court, and Ballinasloe. The wheat produced in the southern portion of this tract is of a superior quality; and the numerous demesne-lands occurring throughout it are among the most fattening pastures in Ireland. The remainder of the eastern district is more an oat and barley country. On the lighter soils great numbers of sheep are fed. The cultivated ground west of Galway is of small extent. A good deal of bog land has been reclaimed. In 1847 the land under culture was thus appropriated:—Corn and beans, 141,318 acres; potatoes, 12,876; turnips, 14,788; meadow and clover, 37,146; all other crops, 3460; total under crops, 209,588 acres. The chief produce was wheat, 129,315 qrs.; oats, 489,646 qrs.; barley, 65,660 qrs.; potatoes, 101,787 tons; turnips, 223,978 tons; hay, 70,538 tons. The live stock in 1847 comprised 28,520 horses and mules; 12,404 asses; 101,452 cattle; 356,411 sheep; 19,786 pigs; 7555 goats; 259,193 head of poultry. The number of land-holdings in the county, in the

same year, was 55,448, averaging about 30 acres each.

The fisheries off the coast yield a very considerable produce. Nearly 100 million herrings have been caught in one year. Besides the herring fishery, there is an excellent take of cod, ling, whiting, and turbot, from December to March; and of gurnet, mackerel, bream, and pollock, from May to August, together with a copious supply of oysters, lobsters, and crabs. The sun-fish deep-sea fishery is peculiar to this coast. The manufactures of this county comprise scarcely any but a few coarse friezes, linens, and hosiery.

Divisions and Towns.—Galway is divided into 18 baronies, of which the Isles of Arran form one. It comprehends the whole of the diocese of Kilmacduagh, and parts of those of Tuam, Clonfert, Elphin, and Killaloe. It returns 2 members to parliament for the county, and 2 for the borough of Galway. It is in the Connaught circuit, and the assizes are held at the town of Galway.

The following are the principal towns, with the population of each in 1841:—

Athenry, a very ancient town, is situated 14 miles E. from Galway. It has somewhat increased of late years, but is still a poor place. Population, 1226.

Ballinasloe is situated on both sides of the river Suck, eight miles from its outfall into the Shannon. The smaller part of the town is in Roscommon, and has a population of 305; the larger part, in Galway, has a population of 4629; total, 4934. The Grand Canal is extended from the Shannon to Ballinasloe, and has considerably improved the corn-trade of the district. The town is tolerably well built, is clean, paved, and lighted with gas; it has a court-house, a district lunatic asylum, union workhouse, church, Roman Catholic chapel, Methodist meeting-house, and several schools. A very large sheep, cattle, and horse fair is held annually. The average number of sheep sold is from 50,000 to 60,000, and of cattle from 6000 to 7000.

Clifden, a modern town and port, is about 4 miles from the sea, with which it is connected by a narrow inlet, and 46 miles W. by N. from Galway. It is the principal town of Connemara. The town is built with some regularity, and has a large Roman Catholic chapel, a neat church, a sessions-house, and a union workhouse. About 1000 tons of oats are exported annually. Population, 1509.

Clonfert, a small place 3 miles N. from Eyrecourt, was formerly a separate bishopric, but is now included in the united bishopric of Killaloe, Kilfenora, Clonfert, and Kilmacduagh. The cathedral has been converted into the parish church.

Eyrecourt, 6½ miles W. from Banagher, on the eastern bank of the Shannon, is a small decayed town, with a population of 1419.

Gort is a small but thriving town, prettily situated near the boundary of Clare, 15 miles S.S.W. from Loughrea. It is watered by a stream which is the outlet of several small lakes, and which falls into Galway Bay at Kinvara Harbour. It has a large Roman Catholic chapel, a church, and a union workhouse. The trade of the town is chiefly connected with the supply of the surrounding country. Population, 3056.

Headford, 12 miles S.W. from Tuam, is a small and poor town, but is tolerably neat and clean. It contains a sessions-house and a neat Roman Catholic chapel. Population, 1647.

Loughrea, is a straggling, ill-built town, situated near the northern shore of the pretty lake called Loughrea, 23 miles E. by S. from Galway. The surrounding country is fertile, and the town has a considerable retail trade with it. There is a commodious Roman Catholic chapel, a Carmelite friary and nunnery, a neat parish church, a union workhouse, and the ruins of an ancient monastery. The town was formerly surrounded with walls. Population, 5458.

Portumna, a small town consisting of long lines of cabins, is situated about a mile from the west bank of the Shannon, near the head of Lough Derg. There is in the town a church, a Roman Catholic chapel, and the ruins of a Dominican friary. Population, 1643.

Tuam, an ancient city, is situated on both sides of the Harrow, an affluent of the Clare, which flows by Lough Corrib into Galway Bay. Tuam has been much improved of late years; streets have been widened, better houses built, and other improvements made, but many parts of the town and its outlets consist of wretched hovels. The Protestant cathedral is an ancient edifice, a portion of a larger building. Tuam is also the see of a Roman Catholic archbishop, and the cathedral is one of the finest modern ecclesiastical structures in Ireland. The College of St. Jarlath, for the education of priests, is under the care of the Roman Catholic archbishop of Tuam. The town contains a sessions-house, a dispensary, a fever-hospital, and a union workhouse. Tuam is a great thoroughfare, has a very good retail trade, and affords a market for a large quantity of agricultural produce. Population, 6034. The archbishopric of Tuam is now included in that of Armagh, and the bishopric of Tuam is united with the bishoprics of Killala and Achonry.

Civil History.—The Anglo-Norman family of De Burgho and their followers possessed the chief power in this part of Ireland till the middle of the 14th century; from which time the county was in a very lawless state till the reign of Elizabeth. English law was again introduced by Sir Henry Sidney in 1585; but the Irish mode of life continued to prevail until after the rebellion of 1641 and the war of the revolution of 1688, both of which events affected the property and population of this county to a great extent.

Galway is very rich in antiquities. There are round towers at Ballygaddy, Kilbannon, Kilmacduagh Meelick, Murrough, and Ardrahan. Cromlechs and stone circles are of frequent occurrence. There are several ecclesiastical antiquities in Galway connected with the sees of Tuam, Clonfert, and Kilmacduagh. Of the numerous remains of religious houses throughout Galway, the ruined abbey of Knockmoy is the most interesting. The raths or earthen fortresses of the old Irish, and castles of the early Anglo-Norman lords, are also very numerous.

(*Statistical Survey of the County of Galway*, Dublin, 1824; Inglis's *Ireland; Letters from the Irish Highlands; Parliamentary Papers.*)

GALWAY, a county of a town, seaport, and the capital of the county of Galway, is situated on the north side of Galway Bay, 130 miles W. from Dublin. The county comprises an area of 24,132 acres. The town is built on both sides of the river which flows from Lough Corrib, 3 miles distant, into Galway Bay. The river is crossed by two bridges. The greater part of the town is ancient, and the streets and houses, many of which are mere hovels, have been built without any regard to plan or regularity; but of late years several new streets, with many good houses, have been built. The principal buildings are—the collegiate and parish church of St. Nicholas, a fine old building, 2 Roman catholic chapels, 3 monasteries, 5 nunneries, a county court-house, town court-house, gaol, county infirmary, fever hospital, union workhouse, and barracks. There are many flour-mills, and other mills driven by the water-power of the river. Wheat, oats, and flour are exported, and a good deal of black marble from the neighbourhood. Timber, iron, slates, wines, &c., are imported. The retail-trade is large. A wet-dock, comprising 9 acres, and admitting vessels drawing 14 feet of water, has been formed on the south side of the town. On the west side of the river is the extensive suburb of Claddagh, which is exclusively inhabited by Irish fishermen. The assizes for the county of Galway are held in the town, which is itself governed by a high sheriff, recorder, mayor, and other officers, and a board of 21 commissioners, elected triennially. A Chamber of Commerce, composed of the principal merchants and tradesmen, superintends the commercial affairs of the town. Galway is the see of the recently constituted Roman Catholic bishop of Galway. The number of vessels registered Jan. 1, 1848, was 21 (4033 tons). The number of sailing vessels, coastwise, Jan. 1, 1847, to Jan. 1, 1848, was, inwards, 173 (20,066 tons); outwards, 41 (4354 tons). In the colonial and foreign trade, the number of vessels was, inwards, 139 (26,161 tons); outwards, 145 (25,676 tons). The population of the town in 1841 was 17,275. Galway returns two members to parliament.

GAMA, VASCO DE, the first European navigator who found his way to India by doubling the Cape of Good Hope, was born at the small seaport town of Sines in Portugal. He was in the household of Emanuel, king of Portugal, and, having devoted himself to navigation and discovery, was appointed to the command of an expedition which was to seek its way to the Indian Ocean by sailing round the southern extremity of Africa. The notion of this passage was by no means a new one, and when it was taken up by the Portuguese king its practicability had been pretty well established. Bartholomew Diaz had already in 1487 doubled the Cape in a storm, without knowing it, and discovered 300 leagues of coast; he recognised the Cape on his return. Vasco de Gama sailed from Lisbon on the 8th of July, 1497, five years after the discovery of the New World by Columbus. His squadron consisted only of three small ships with sixty men. Dreadful tempests were encountered, and a mutiny broke out to induce Gama to return. He allayed it however, and on the 19th of November doubled the Cape, and turned along the eastern shore. At the African town of Melinda, he found Christian merchants from India and a pilot from Gujerat. Under this pilot's guidance, Vasco de Gama reached the coast of Malabar in twenty-three days, and anchored before Calicut, a place of considerable manufacture and foreign trade, then chiefly in the hands of the Moors. He was at first very favourably received by the zamarin, or king of Calicut, but he had unluckily brought no suitable presents, and the Moors were jealous of the new comers. Still Gama, it is said, succeeded in convincing the zamarin of the advantages of commercial intercourse with Portugal, and at all events was allowed to depart in safety. On his return he again anchored at Melinda, and took on board an ambassador from the Mohammedan prince of that place. He arrived at Lisbon in September 1499. The sounding title of Admiral of the Indian, Persian, and Arabian Seas was conferred on him. This voyage of Gama is a great epoch in commercial history; it showed the nations of the West the sea road to the remote East; it diverted the trade of the east from the Persian Gulf, the Red Sea, Asia Minor, Egypt, and Italy, the routes in which it had run for 1400 years; and it led ultimately to the establishment in India of a vast empire of European merchants. The effect it had upon Italy was most disadvantageous, and, though there were other causes at work, the decline of the great trading republics of Venice and Genoa may be traced to the discovery of the passage to India by the Cape of Good Hope.

A second expedition to India, under the command of Pedro Alvares de Cabral, led to the accidental discovery of Brazil, whence however the little fleet got to India, and Cabral established a factory at Calicut. The Portuguese however left by Cabral were all murdered. In consequence a third expedition was fitted out of 20 ships, of which the largest division was intrusted to Gama. On his way, he settled factories at Sofala and Mozambique, punished the towns that had before been unfriendly to him, and, after various other adventures, reached Calicut, where he seized all the ships in the port. He then demanded full and sanguinary satisfaction for the murder of the Portuguese, and would listen to no other terms. After three days he barbarously hung fifty Malabar sailors he had taken in the port, then cannonaded and nearly destroyed the town. He made a treaty with the neighbouring state of Cochin, by which they agreed to assist each other against Calicut, and then, having left five ships to protect the factory, he returned to Lisbon in December 1503, and was created Count of Videqueray. The Indian conquests were prosecuted by Albuquerque and others. In 1524 Gama was appointed Viceroy of Portuguese India, and was the first who received that high title. He died however soon after his arrival at Cochin, in December 1525. In 1538

by order of John III., his remains were removed of Portugal.

GAMBIA, a river in Africa, which rises in the mountains of the interior, about 11° 30′ N. lat., 11° W. long. In the upper part of its course it is said to have the name Dimand. More than one-half of its course lies W.N.W. through the mountain region. Where it begins to emerge from the mountains and to enter the hilly country, which separates them from the plain along the shores of the ocean, it receives on the right a considerable branch, the Nerico, which comes down from Bondoo with a south-western course. Soon afterwards it turns due west, and continues in this direction to its entrance into the ocean between 13° and 14° N. lat. The tide ascends nearly as far up as Pisania, where there was formerly a British settlement, and near which there is a rapid which impedes the navigation; from this point to its mouth the course of the river is well known; it mostly runs through a flat country, which however for some distance is inclosed by hills and rising grounds; these heights however sink lower and lower, and disappear entirely at Kayaye, about 120 miles from the mouth of the river. The flat countries along its banks are annually inundated, and are distinguished by their vigorous vegetation. The Casamanza, which enters the ocean about a degree farther south, has been lately shown to be a branch of the Gambia; and it is not improbable that the Cacheo a little further south is another branch.

The English have some establishments on this river, the principal of which is the town of Bathurst, whence the produce of the country is shipped for England.

(Mungo Park; Gray's *Travels in Western Africa*; Balbi, *Géographie.*)

GAMBOGE. [Camboge.]

GAME-LAWS. Some portion of the history of the game-laws in England will be found under Forest Laws, and Warren, Free. Game has been a subject of legislation from the Conquest to the present time. The last general statute which relates to game (2 Wm. IV. c. 32) was enacted in 1831, and it repealed twenty-four acts, eight of which had been passed in the reign of George III. It is doubtful whether the evils of the game-laws have been much diminished by the act of 1831.

Game is declared to include hares, pheasants, partridges, grouse, heath or moor game, black game, and bustards. Snipe, quail, landrail, woodcock, and conies are not game, but they can only be taken or killed by certificated persons. Woodcocks and snipes may be taken with nets or snares, and also rabbits, by the proprietor, in an inclosed ground, or by a tenant and his servant.

A penalty not exceeding 2*l.* over and above the value of the bird is incurred for killing, wounding, or taking any house-dove or pigeon when the offence does not amount to a larceny (7 & 8 Geo. IV. c. 29).

Any person who purchases a certificate or licence may kill game on his own land, or upon the land of any other person with his permission. This alteration was effected by 2 Wm. IV. c. 32, before which time a person was required to be possessed of a qualification by estate or birth to entitle him to kill game. By 22 & 23 Car. II. c. 25, the qualification was limited to persons who had an estate of inheritance of 100*l.* per annum or an estate for term of life or 99 years, or upwards of 150*l.* annual value. On this Blackstone remarks, There was 'fifty times the property required to enable a man to kill a partridge as to vote for a knight of the shire.' Qualifications were also of a personal nature, as being the son and heir apparent of an esquire. Persons who had not these qualifications were not allowed to have or keep game dogs.

Certificates were first required to be taken out by persons qualified to kill game by the Act 25 Geo. III. c. 50. The certificate itself, which costs 3*l.* 13*s.* 6*d.*, now gives a qualification. It must be taken out annually, and expires in July. Uncertificated persons who kill or take any game, or who use any dog, gun, &c. for the purpose of searching for or killing or taking game, are liable, on conviction before two justices, to a penalty not exceeding 5*l.* for each offence, with additional penalties under the Certificate Act of 23*l.* 13*s.* 6*d.* Penalties under 1 & 2 Wm. IV. c. 32 are given to the parish, to be applied in aid of the county-rate, and in some cases a portion of the penalty goes to the informer.

The right to the game is vested by 1 & 2 Wm. IV. c. 32, in the tenant in all cases where it is not reserved to the landlord in his agreement with the tenant; but the game is generally coveted by the landlord, and there are few tenants who are in a situation to oppose their landlord. The consequence is, that the game is reserved by the landlord when he lets his land, and, when this is the case, the occupier can neither kill game nor give permission to another person to do so. He is liable, under 1 & 2 Wm. IV. c. 32, to a penalty of 20*s.*, with costs, for every head of game killed by him or other persons authorised by him. When the landlord reserves the game, he may kill it on the tenant's land, or authorise any certificated person to enter on the land and kill the game. The tenant may kill woodcocks, snipes, quails, landrails, or rabbits, on the land which he occupies, but he cannot authorise other persons to kill them.

The 11 & 12 Vict. c. 29, enables persons who are in the occupation of inclosed ground, or any owner thereof who has the right of killing game thereon, to take or kill hares on such ground without a game certificate, subject to certain regulations.

The law is very severe against persons not authorised who take and destroy game by night (9 Geo. IV. c. 69). By 1 & 2 Wm. IV. c. 32, 'day-time' is to be deemed from one hour before sun-rise to one hour after sun-set. The punishment for night-poaching is still more severe when three or more persons enter any land for the purpose of taking or destroying game or rabbits, armed with a gun, bludgeon, or other offensive weapon, and they are subject to transportation for a period not exceeding fourteen years, or to imprisonment with hard labour for not exceeding three years. In 1844 an act was passed (7 & 8 Vict. c. 29) which extended the provisions of 9 Geo. IV. c. 69, against night-poaching to persons

who take or kill game or rabbits upon public roads or highways, and other roads and paths leading to inclosed gates, and also at the gates, outlets, and openings between such lands and roads or paths.

By the Act 7 & 8 Geo. IV. c. 29, it is felony to course, hunt, snare, carry away, kill or wound, or attempt to kill or wound, any deer kept in any inclosed land, whether forest, chase, or purlieu, or other place wherein deer is usually kept. The punishment is transportation for seven years, or imprisonment for two years. If the offence be committed in the uninclosed part of a forest, chase, &c., the penalty for the first offence is a sum not exceeding 50*l.*; and for a second offence, transportation or imprisonment.

The right of appointing persons called gamekeepers, who are, properly speaking, a game police, does not belong to all owners of lands. Gamekeepers were first allowed to be appointed by 22 & 23 Car. II. c. 25. Before the Act 1 & 2 Wm. IV. c. 32 was passed, a person could only appoint one gamekeeper. By this act lords of manors may appoint one or more gamekeepers to preserve or kill game within the manor for their own use. Lords of manors may depute any person to be a gamekeeper to a manor, with authority to kill game for his own use or that of any other person named in the deputation. The gamekeepers are authorised to seize all dogs, nets, and other engines used for killing game by uncertificated persons.

Until the passing of the Act 1 & 2 Wm. IV. c. 32, no person was allowed to sell game; but it was made saleable by this act, as the law was systematically evaded. A dealer in game must obtain an annual licence from the justices, who hold a special session in July for the purpose of granting such licences. Innkeepers, victuallers, retail beer-sellers, guards, coachmen, carriers or higglers, or persons in the employ of any of these classes of persons, are prohibited from dealing in game. Licensed dealers who buy game of any person not authorised to sell it are liable to a penalty of 10*l.* with costs. A person not being licensed, who buys game of an unlicensed person, subjects himself to a penalty not exceeding 5*l.* for each head of game, with costs.

The preservation of game is an object of constant solicitude to nearly all those who belong to the landed gentry in this country. Within the last fifty years game has been preserved to an excess which was previously unknown. Most of the laws relating to game which have been passed within this period have been made to enable game-preservers to indulge in this taste, and to visit with greater severity those who are tempted by the abundance of game to become poachers. The accumulation of game in preserves, watched and guarded by numerous keepers, has led to changes in the modes of sporting. The sportsman of the old school was contented with a little spoil, but found enjoyment in healthful recreation and exercise, and was aided by the sagacity of his dogs. In the modern system of battue-shooting, the woods and plantations are beaten by men and boys; attendants load the sportsman's guns, and the game is driven within reach of gun-shot, and many hundred head of game are slaughtered in a few hours. In an ordinary day's sport of this description, seven or eight hundred head of game may be killed by three or four sportsmen in about four hours, and perhaps fifty or sixty wounded may be picked up on the following day. A couple of gentlemen may kill nine hundred hares in one day. On a great field day, when the sportsmen are more numerous, the slaughter is immense. Whole waggon-loads of hares are sent off to the London and other great markets for sale, as the result of one day's sport.

The effect of protecting game by oppressive laws is perhaps more injurious to the morals of the rural population than any other single cause. With a densely crowded population, thousands of whom are often pressed by hunger, and frequently in a state of the most lamentable poverty, the temptation to kill game is irresistible. It swarms before the labourer as he returns home in the evening from his long day of hard toil. The number of persons convicted at assizes and sessions in 1843, for infractions of the game-laws in England and Wales was 4529, of whom 40 were transported. Between 1833 and 1834 there were 41 inquests on gamekeepers found dead, and in 26 cases verdicts of wilful murder were returned. In 1843, out of 201 persons summarily convicted in Bedfordshire, 143 were committed for poaching, and sentenced to prison for an average period of seven weeks each. In the same year, out of 539 persons committed to the county gaol for Buckinghamshire, 169 were for offences against the game-laws. The wives and families of these men must be maintained during the husband's imprisonment; and hence the poor-rates and the county-rates are at the same time increased. Gaols require to be enlarged; and, as poaching leads to other crimes, a more extensive police is required for the protection of property. The time of this force is not a little taken up in preventing, detecting, and apprehending poachers. The game-laws are in this way a heavy burden on the occupiers of land.

The total public expenditure which the preservation of game occasions is probably more onerous than that which is required for the support of pauperism in this country. Game, and the game-laws, are among the greatest hindrances to the improvement of agriculture. They not only prevent a gain, but they occasion a loss to the aggregate of agricultural products.

Many landowners take means to insure the preservation of game which none but tenants in a wretched state of dependence would submit to. The tenant is not allowed to use his best skill in the application of his capital to the land, but is interfered with on account of the game. This game devours the produce of the land, is fattened at the tenant's expense (compensation for the destructiveness of game being generally futile and deceptive), and the landlord pockets the money which the game thus fed produces in the market. The effect would be far less injurious if the landlord turned a certain proportion of his oxen and sheep to feed with those which belong to his tenants. There are instances where the landlord lets the game on the tenant's land to a third person, and thus gets two rents, one rent for the land, and another for the game after it has been fed by the farmer.

It has often been stated that from three to five hares eat and destroy as much as would keep one sheep. On many farms the number of hares averages at least two per acre: and the destruction by hares alone is often equal to an additional rental of 10*s.* per acre on the whole of the farm: there is, besides, the waste and destruction caused by rabbits, pheasants, and partridges. On some farms of 500 acres where the game is strictly preserved, but not excessively, the loss caused by hares will amount often to above 200*l.* The landlord sells the hares at perhaps 1*s.* 6*d.* each, and pockets 75*l.*

Many of the reservations and covenants in leases in relation to game are fit only for the copyholders of a manor four or five centuries ago. Legislation cannot directly produce any improvement in this state of things. It arises from the dependent condition of the great majority of the tenant farmers; and, if a law were passed which gave them the right to kill the game on their lands, it would be of no advantage to them. The game-keepers and other retainers of the great and small game-preservers are spies on the tenant, and in the intense competition for farms he dare not contravene the wishes of his landlord. Public opinion may and does produce some effect on the landlord's exercise of his power, but this is confined to isolated cases.

The administration of the game-laws in England is in the hands of persons who are either game-preservers themselves, or who, generally speaking, are not unfavourable to the system, and hence the rigour with which offences against the law are visited. Before the Act 1 and 2 Wm. IV. c. 32 was passed, penalties for infractions of the game-laws could be recovered before one justice; but now conviction can only take place before two justices, and an appeal lies to the quarter sessions, but a certiorari is not allowed. There was no appeal formerly, and great obstacles were thrown in the way of obtaining a certiorari. The expenses of appeal are heavy.

On the 27th of February, 1845, on the motion of Mr. Bright, M.P. for Durham, a select committee was appointed to inquire into the operation of the game-laws. A report of the House of Commons on the game-laws was published in 1845, and another in 1846.

The number of certificates taken out annually to kill game is about 40,000 in Great Britain, and the number of licences to sell game about 800.

In other countries, as well as in England, game-laws have been an instrument of oppression. In France, before the first Revolution, there were edicts for preserving game which 'prohibited weeding and hoeing, lest the young partridges should be disturbed; steeping seed, lest it should injure the game; manuring with night-soil, lest the flavour of the partridges should be injured by feeding on the corn so produced; mowing hay, &c. before a certain time, so late as to spoil many crops, and taking away the stubble which would deprive the birds of shelter.' (Arthur Young's *Travels in France in* 1787-88-89.) The Constituent Assembly abolished this exclusive 'droit de la chasse.'

GAMING, or GAMBLING, is an amusement, or we might properly call it a vice, which has always been common in all countries and among all classes, but more particularly those who have no regular occupation.

In England, before the passing of 8 & 9 Vict. c. 109, wagers in general were viewed as legal contracts, and the winner of a wager could enforce his claim in a court of law. The exceptions to this rule were, where the wager was an incitement to a breach of the peace or to immorality; where it affected the feelings or interests of third persons, or exposed them to ridicule or inconvenience; or where it was against sound policy or prohibited by statute.

In the session of 1845 the Act 8 & 9 Vict. c. 109 was passed, which enacts 'That all contracts or agreements, whether by parole or in writing, by way of gaming or wagering, shall be null and void; and that no suit shall be brought or maintained in any court of law or equity for recovering any sum of money or valuable thing alleged to be won upon any wager, or which shall have been deposited in the hands of any person to abide the event on which any wager shall have been made: provided always, that this enactment shall not be deemed to apply to any subscription or contribution, or agreement to subscribe or contribute, for or toward any plate, prize, or sum of money to be awarded to the winner or winners of any lawful game, sport, pastime, or exercise.' Under 8 & 9 Vict. c. 109, cheating at play is to be punished as obtaining money under false pretences. The act of 16 Charles II. c. 7, is repealed by 8 & 9 Vict. c. 109.

The Act 8 & 9 Vict. c. 109, repeals those parts of 9 Anne, c. 14, and 18 Geo. II. c. 34, which rendered it illegal to win or lose any sum exceeding 10*l.* at play or by betting; and there is a clause under which all actions and informations commenced previous to this act under former statutes against gaming are to be discontinued on payment of costs.

The Act 7 Geo. II. c. 8, which was made perpetual by 10 Geo. II. c. 8, entitled 'An Act to prevent the infamous practice of Stock-Jobbing,' is violated hourly on the London Stock-Exchange by the practice of time-bargains.

The Acts 19 Geo. II. c. 37, and 14 Geo. III. c. 48, are intended to prevent transactions of the nature of gaming or wagering on policies of marine and life insurance.

Various acts were passed at different times for suppressing lotteries not allowed by law, and at length the state lotteries themselves were put an end to.

All gaming-houses are regarded as nuisances at common law, and those who keep them are liable at common law (independently of statutory provisions) to be indicted and punished by fine and imprisonment at discretion.

The Statute 33 Hen. VIII. c. 9, entitled 'The bill for maintaining artillery and the debarring of unlawful games,' prohibits the keeping for gain, lucre, or living, any house or place of 'bowling, coyting, cloysh-cayls, half-bowl, tennis, dicing-table, or carding, or any other manner of game prohibited by any statute heretofore made, or any unlawful game now invented or made, or any other

new unlawful game then or hereafter to be invented, found, had, or made,' on pain of forfeiting 40*s.* a day. The same statute imposes a penalty of 6*s.* 8*d.* for every time upon any person using such houses and there playing.

The Act 8 & 9 Vic. c. 109, greatly facilitates proceeding against any common gaming-house.

The punishment which may be inflicted on gaming-house keepers, in addition to the penalties mentioned in 33 Hen. VIII. c. 9, is a penalty not exceeding 100*l.*, or imprisonment with or without hard labour for a term not exceeding six months.

By 5 Geo. IV. c. 83, persons betting, &c. in any street, or open and public place, are punishable summarily as rogues and vagabonds.

GA'MMARUS, a genus of amphipodous Crustaceans, the *Crevettes* or *Chevrettes* of the French.

Example.—*Gammarus Pulex* of Fabricius and Latreille; *Cancer Pulex* of Linnæus; *Gammarus aquaticus* of Leach; *Crevette des Ruisseaux* of Geoffroy,—the *Fresh-Water Shrimp*.—This crustacean, which abounds in springs and rivulets, always swims near the bottom on its side, and its progression is principally performed by the rapid jerks of the appendages of the tail. The animal is carnivorous, and feeds principally on dead fishes, and often on the carcasses of its own species. The male may often be seen swimming coupled with the female, which is much smaller, and which he holds between his legs. She keeps her eggs till they are hatched, and the young for some time seek shelter under her abdomen and the lateral appendages of her body. There are some marine species.

GAMUT or GAMMUT, in Music, signifies the diatonic scale, as named either by the first seven letters of the alphabet, or by the syallables used in solmisation, *i.e.* do, re, mi, fa, sol, la, si. [Diatonic; Scale; Solmisation.] And occasionally the term is applied to a single note—the G below the base clef.

GANDERSHEIM. [Brunswick.]

GANDON, JAMES. As to the date of the birth of this eminent architect, it is only known that as he died in 1824, at the age of 82, he must have been born about 1741–2. He studied under Sir William Chambers, and was the first who obtained the gold medal for architecture at the Royal Academy; on which occasion Reynolds is said to have complimented him, and to have predicted his future fame. He began to make himself known in his profession by undertaking a continuation of Campbell's 'Vitruvius Britannicus,' the first volume of which, or fourth of the series, appeared in 1767, and the second in 1771. Though he had Woolfe for his coadjutor in the work, Gandon appears to have taken the chief share of the management and editorship upon himself. In the 'Vitruvius' appeared Gandon's 'Court Hall' at Nottingham, which obtained for him the notice of Sir George Saville, Mason the poet, and other persons of distinction, and probably brought him professional employment, as he discontinued the 'Vitruvius,' after the second sppplementary volume; nor has the work since been resumed by other editors. On premiums being offered by advertisement for the best design for a Royal Exchange at Dublin, Gandon's obtained the third and those by Cooley [Cooley] and Thomas Sandby the first and second prizes. But it was not long before an opportunity presented itself in the Irish capital very far exceeding the Exchange both in magnitude and importance. The Custom House of Dublin, a magnificent pile of 375 by 209 feet (begun in 1781 and finished 1791), is one of the noblest structures of the kind in the world—perhaps the noblest of all—and would of itself alone suffice for the fame of any architect. Dublin is also indebted to him for several others of its finest buildings—the eastern front and Corinthian portico of the House of Lords, now the Bank of Ireland; the Four Courts (begun by Cooley, but completed by Gandon, with great alterations from the original design), and the King's Inns. He also built the Court-house at Waterford. Gandon died at Cannonbrook, near Lucan, Ireland, at the beginning of 1824.

GANGANELLI. [Clement XIV.]

GANGES. [Hindustan.]

GANGES. [He'rault.]

GANNAT, Population, 5299. [Allier.]

GANNET. [Booby.]

GA'NODUS, a species of fossil Ganoid Fishes, from the oolite of Stonesfield. Seven species.

GANOID FISHES, a grand division of Fossil Fishes in the classification of M. Agassiz. [Fishes, Fossil.]

GANS, EDWARD, was born March 22, 1798, at Berlin, and was descended from Jewish parents. His father was a wealthy man. After having been educated at the gymnasium called Das Graue Kloster (the Gray Cloister), in his native town, Gans entered the University of Berlin, in 1816, as a student of law. In the following year he went to Göttingen, and there, at the age of nineteen, obtained the prize for the best answer to the questions proposed by the faculty of law on the history and the civil and political laws of Rhodes. In 1818 he left Göttingen, and went to Heidelberg, where he enjoyed the friendship of Thibaut, the jurist, and Hegel, the philosopher. At Heidelberg he wrote several articles for the 'Civilistisches Archiv,' edited by Gensler, Thibaut, and Mittermaier; and the 'Zeitschrift für die Wissenschaft des Judenthums,' in which he gave eminent proofs of his talents and learning. He took the degree of doctor in law in 1819, in the same university, and there also published a little work 'Ueber Römisches Obligationen-Recht.'

In 1820 Gans returned to Berlin, was admitted by the university as public lecturer on law (privatim docens), and in the same year published his 'Scholien zum Gajus' [Gaius], a work which has some merit. Gans entered into a close alliance with Hegel and Thibaut, who with Feuerbach, Grollmann, and other distinguished jurists, were the originators of the school of philosophical jurisprudence, of which Gans soon became one of the most eminent leaders. Their principal aim was to explain the nature of law and its bearing upon the past as well as the future, through the medium of philosophical ideas, and to show its connexion with the moral, social, and political progress of man-

kind; and it cannot be denied that they exercised a beneficial influence upon legislation, the bar, and the judicature. Many of their followers however were misled by the influence of some favourite system of metaphysics, forgetting that every law is, or at least ought to be, the product of some national want, they published legal commentaries fit to puzzle the most plain and straightforward judge and the most sophistical advocate.

The other works of Gans are 'Das Erbrecht in weltgeschichtlicher Entwickelung,' Berlin, Stuttgart and Tübingen, 4 vols. in 8vo., 1824–35 (The Law of Succession, its historical development, and its importance for the history of the world), by which he placed himself among the first jurists of Germany. In 1825 Gans was appointed professor extraordinarius, and some years afterwards professor ordinarius at the university of Berlin. The latter dignity is not bestowed upon Jews in Prussia, but Gans had adopted the Christian religion, at Hamburg, some time previous to his appointment. In 1826 he published 'System des Römischen Civil-Rechts' (System of the Roman Civil Law), and founded a new Review of which Berlin stood in great need, the 'Jahrbücher für wissenschaftliche Critik' (Year-Books for Scientific Criticism). After the French Revolution of 1830, he went to France, which he had already visited previously. From France he went to England. The Prussian government, being suspicious of Gans, set spies upon him. On his return to Berlin he began a course of lectures on modern history in the university, and his learning, eloquence, wit, and liberal principles attracted an immense crowd, even in the midst of a most severe winter (1832–33). But the government compelled him to give up his lectures, on the pretext that, being a professor of law, he had no right to deliver lectures on history. Little discouraged by this check, Gans introduced subjects connected with modern history into his lectures on law; the Prussian government, dreading his sharp tongue as well as his principles, commenced a system of annoyance and petty persecution against him, in which it was assisted by the numerous enemies of the professor. In the following year Gans published 'Vorlesungen über die Geschichte der letzten Fünfzig Jahre' (Lectures on the history of the last fifty years), in Raumer's 'Historisches Taschenbuch' for 1833 and 1834; 'Vermischte Schriften, juristischen, historischen, staatswissenschaftlichen, und ästhetischen Inhalts' (Miscellaneous writings on jurisprudence, history, &c.), Berlin, 1834, 2 vols. 8vo.; 'Rückblicke auf Personen und Zustände' (Retrospective view of individuals and events), Berlin, 1836; 'Grundlage des Besitzes' (The Basis of Possession), Berlin, 1839, an attack upon Savigny's celebrated work on the Law of Possession among the Romans. Most of his time he devoted to a complete edition of the works of Hegel, those that were published already, and those which Hegel left partly unfinished in MS., especially Hegel's Philosophy of History; and without Gans we should perhaps never have seen a complete edition of Hegel, for he was, according to Hegel's own words, the only man who thoroughly understood his great but obscure master. On the 1st of May, 1839, while dining with a friend, Gans fell suddenly speechless from his chair, being struck by apoplexy; he died on the 5th of the same month.

Gans was one of the most learned, most witty, and most eloquent men of Germany; distinguished as an author, and unsurpassed as a lecturer. His fame would have been still greater had he had an opportunity of displaying his talents on the political stage. No man was his equal in controversy; he confounded the most skilful of his adversaries by his sarcastic replies. Those whom he wounded deepest and spared least were men of acknowledged authority, or of high rank or birth, and among them he had his bitterest enemies.

(*Neuer Nekrolog der Deutschen; Allgemeine Zeitung* (*Supplement*) of 1839, No. 132; *Conversations-Lexicon der Gegenwart.*)

GANYME'DA, Mr. Gray's name for a genus of radiated animals allied to the *Echinidæ* and the *Asteriidæ*. The genus, in Mr. Gray's opinion, is very nearly allied to Dr. Goldfuss's *Glenotremites paradoxus*, but Mr. Gray points out the differences, and is induced to consider these two genera as forming a family or order between the *Echinidæ* and the *Asteriidæ;* allied to the latter in having only a single opening to the digestive canal, and agreeing with the former in shape and consistence, but differing from it in not being composed of many plates. Mr. Gray only knew of two specimens of *Ganymeda*, which he believes were found on the coast of Kent, as he discovered them mixed with a quantity of *Discopora Patina*, which he collected several years ago from fuci and shells on that coast. Size of specimens one-eighth of an inch in diameter. Species *Ganymeda pulchella*, Gray. (*Zool. Proc.*, 1834.)

GAOL. [Transportation.]

GAOL DELIVERY. The commission of gaol delivery is directed to the justices of assize of each circuit, the serjeants and king's counsel attending that circuit, the clerk of the assize, and the judges associate. It is a patent in the nature of a letter from the king, constituting them his justices, and commanding them, four, three, or two of them, of which number there must be one at least of the judges and serjeants specified, and authorising them to deliver his gaol at a particular town of the prisoners in it; it also informs them that the sheriff is commanded to bring the prisoners and their attachments before them at a day to be named by the commissioners themselves. Under this commission the judges may proceed upon any indictment of felony or trespass found before other justices against any person in the prison mentioned in their commission and not determined, in which respect their authority differs from that of justices of oyer and terminer, who can proceed only on indictments found before themselves. (2 Hale, *P. C.*) [Assize.]

Anciently it was the course to issue special writs of gaol delivery for each prisoner, but a general commission has long been established in their stead. (4 Bl. *Com.*; Hawk., *P. C.*)

GAP. [Alpes, Hautes.]

GAR-FISH (*Bélona vulgaris*, Cuvier), a species of fish inhabiting the European seas, and which is caught in tolerable abundance on va-

rious parts of the coast of our own country. This fish is allied to the Pike, and, from the resemblance it bears to that species, has been called by some the *Sea Pike*. It is however of a more elongated form, and is remarkable for the great length and slenderness of the jaw-bones.

The Gar-Fish is sold in the London and other markets, Its flesh somewhat resembles that of the mackerel in flavour, but is more dry. Before it is cooked it emits an unpleasant odour. The bones are green. 'The elongated narrow beak-like mandibles of this fish makes a knowledge of its food a subject of some interest; but I have only found,' says Mr. Yarrell, 'a thick mucus in the stomach, without any remains that I could name. In all the works to which I have access, I can find no mention of the nature of its food.'

GARÇÃO, PEDRO ANTONIO CORREA, the best lyric poet of Portugal, was born at Lisbon in 1735. After labouring strenuously to correct the bad taste of his countrymen, his somewhat premature death at forty prevented the further success of his talents and exemplary perseverance. He is distinguished for his odes, satires, and epistles, and for his dramas. The 'Obras Poeticas de P. A. C. Garção,' 8vo., were first published at Lisbon in 1778.

GARCILA'SO DE LA VEGA, the intimate friend and associate of Boscan in the radical and successful reformation of Spanish poetry, was born at Toledo, in 1500, or, according to some biographers, in 1503. His family enjoyed great consideration and military reputation; and Garcilaso himself, from the age of eighteen, followed Charles V. over Europe, and in his expeditions to Africa till the disastrous retreat of the Imperialists from Marseille in 1536, when, being the first to mount the breach of a tower, which he was ordered to carry by assault, he lost his life in the attempt.

Garcilaso introduced and naturalised among his countrymen the modern Sapphic or Italian eleven-syllabic verse. His sonnets are very sweet, and his odes uniformly excellent. But his masterpiece is the first of his three eclogues, which has never been equalled by any of the numerous imitations of it. Garcilaso wrote it at Naples under the inspiration of Virgil's tomb, and stimulated by Sannazaro's reputation. Garcilaso stands at the head of the pastoral poets of Spain, and he would have been the first of her lyric poets, if he had lived longer, or if Herrera, in the following century, had not gained that title for himself.

GARCILA'SO, the Inca, as he styled himself, was born at Cuzco, in Peru, towards the middle of the sixteenth century, after the conquest of that country by the Spaniards. His father Garcilaso de la Vega, allied by blood to the noble houses of Feria and Infantado, served under the Pizarros in that expedition. He married, at Cuzco, Elizabeth Palla of the race of the Incas, who is stated in her son's epitaph at Cordova to have been sister to Huayna Capac, the last emperor of Peru. [ATAHUALLPA.] Young Garcilaso came to Spain at an early age, about 1560; he obtained the rank of captain in the Spanish service, but he seems to have lived the greater part of his life at Cordova, where he died in April 1616. He is now chiefly remembered for his 'History of the Incas' and his 'History of Florida,' which were translated and published in French, 2 vols. 4to., Amsterdam, 1727.

GARCI'NIA, a genus of the natural family of *Guttiferæ*, named in honour of Dr. Garcin, who travelled in the East Indies.

G. mangostana is the most remarkable species, being the Mangosteen of the Malays, reckoned one of the most delicious of all fruits, and not alone of the countries where it is indigenous, but, as Marsden says, 'is the pride of the Malay Islands, and perhaps the most delicate fruit in the world.' It is a native of the Malayan peninsula and of the islands to the eastward of the Bay of Bengal, forming trees of considerable size, with a straight trunk and numerous spreading opposite branches forming an elegant conical head. The tree is considered one of the most ornamental in Batavia for gardens, and also as affording an agreeable shade. Bontius compares its appearance to that of the citron tree. It is in flower and fruit a great part of the year, according to Roxburgh, but Marsden says, 'the returns of its seasons are very irregular.' So wedded is it to its indigenous soil and climate, that the innumerable attempts made to cultivate it elsewhere have uniformly failed. The fruit before ripening is slightly acid. The rind is powerfully astringent, and its decoction is employed in dysentery, and as a gargle in slight ulcerations of the mouth. The bark of the trunk and branches are also considered astringent, and said to be employed by the Chinese in dyeing.

G. cambogia, cowa, lanceæfolia, kydia, pedunculata, and *paniculata*, all yield a kind of edible fruit, but of these the last is most like the Mangosteen. From incisions made in the branches a yellow juice exudes and soon concretes, having a close resemblance to, and in fact forming an inferior kind of gamboge.

GARD, a department in the south of France, formed out of portions of Bas-Languedoc, is bounded on N.W. and N. by Lozère and Ardèche; E. and S.E. by Vaucluse and Bouches-du-Rhône; S. by the Mediterranean; S.W. and W. by Hérault and Aveyron. The form of the department is irregular; its greatest length from E. to W. is 76 miles; from N. to S. 72 miles. The area is about 2286 square miles, and the population in 1841 was 376,062, which gives 164.5 to the square mile, being 3.5 below the average per square mile for all France. A large proportion of the population are Protestants, who have consistorial churches in all the principal towns of the department.

The north-western part of the department is occupied by the branches of the Cévennes, of which the principal ridge is for the most part without the boundary of the department. From this part the face of the country gradually declines to the south-east, in which direction the principal rivers flow to the Rhône and the Mediterranean. The coast and the lower banks of the Rhône are lined with étangs, or pools, of considerable size.

The principal rivers are—the Rhône, which bounds the department on the east, and its tributaries from the right bank, namely, the ARDE'CHE; the Cèze, which drains the north of the depart-

ment; the Gard, which gives name to the department, drains its central districts and falls into the Rhône, a little above Beaucaire; it is formed by the junction of three streams which rise in the Cévennes, in the department of Lozère, and are distinguished by the names, Gardon-d'Alais, Gardon-d'Anduze, and Gardon-de-Miaulet. These rivers all rise in the Cévennes; they are subject to inundations, which sometimes cause great ravages. The Vidourle flows S. from its source near Le-Vigan, into the Etang of Mauguio, in the adjacent department of Hérault. The Vistre, which flows near Nîmes, and the Rhosny, which flows near Aymargues, unite and serve as feeders to the Radelle Canal. The Hérault and some of its tributaries, and also the Dourbie, an affluent of the Tarn, have their sources in the department. Of these rivers only the Rhône and the Ardèche are navigable.

The department is traversed by a navigable canal from the Rhône at Beaucaire to Aiguesmortes, the principal town in the south of the department, which communicates with the Mediterranean by the Grande-Robine Canal and the Grau (a harbour formed by dikes running into the sea); and by the Radelle Canal with the Canal des Etangs, which last joins the Canal du Midi at Cette. There is another branch-canal, that of Bourgidou, from Aiguesmortes to the canal of Sylveréal by which the navigation of the most western branch of the Rhône is facilitated. The length of canal navigation in the department is about 50 miles. The department is crossed by 10 royal, 28 departmental, and 21 parish roads. It is also crossed by 3 railroads: one from the mines of Grand'Combe through Alais to Nîmes; another from Nîmes through Beaucaire to Marseille, and a third from Nîmes to Cette through Montpellier.

Important iron, coal, and silver-lead mines are worked. Silver, copper, and calamine are found; but the working of the mines has been abandoned. Sulphate of iron, manganese, kaolin, antimony, fuller's and potter's clay, plaster of Paris, building stone, &c., are also found.

The air in this department is commonly mild; but in March and April considerable changes of temperature are experienced within the twenty-four hours. In June, July, and August, the heat is very great, the maximum being 99° 5′ Fahrenheit. The department is scourged by the wind, called *Mistral* [Bouches-du-Rhône], and, when this does not blow, by clouds of mosquitoes during the hot weather. The autumn is usually dry and cool. The greatest cold is commonly at the end of December.

The surface contains 1,463,183 acres, distributed among 114,874 proprietors, and subdivided into 1,143,478 parcels. Of this area 389,291 acres are arable; 176,207 under vineyards; 20,711 are meadow land; 152,988 are under plantations of the mulberry, olive, &c.; 266,078 are covered with woods and forests; 390,584 with heaths and moors; and 37,391 with canals, pools, and marshes. The sheltered hills and the plains are devoted to the cultivation of the vine, the olive, the mulberry, and the almond. The arable land is contained chiefly in the valleys. The produce of the department in grain is not sufficient for the home consumption; but what wheat is grown is of superior quality. Besides wheat, the other grains cultivated are oats, rye, barley, maize, millet, and buckwheat, of which the total annual produce does not exceed 515,625 quarters. Lentils, peas, and potatoes are grown; but the main support of the peasantry are chestnuts, of which immense quantities of excellent quality are produced on the slopes of the Cévennes. The vine is extensively cultivated all through the department, which yields annually 26,400,000 gallons of good strong wine, one-fourth of which is consumed at home, one-sixth is distilled into brandy, and the remainder is exported through Cette, chiefly for the purpose of mixing with the poorer wines of more northern departments. The olive, too, is carefully cultivated in sheltered spots, and on the southern slopes of the hills; the oil of the department is in high repute. The cultivation of the mulberry, which here becomes a large and beautiful tree, is very extensive; the number growing in 1835 amounted to 5,709,466. Cherries, apricots, peaches, figs, pomegranates, &c., are abundantly produced. Indeed the chief agricultural wealth of the department consists in its wines, oil, silk, and delicious fruits. Medicinal herbs, madder, and other dye stuffs, are grown.

Only a small number of oxen are reared: but sheep are numerous, and their wool is very fine. The horses are small, but vigorous and lively. Among the wild animals are wolves, foxes, otters, beavers, eagles, vultures, wild ducks, ortolans, red partridges, storks, bustards, &c., &c.; the ponds and rivers abound with fish.

The industrial products of the department are varied and important. The principal are silk textures of all kinds, the chief seat of which is Nîmes; cachemere shawls, made of a mixture of Tibet wool, silk, and cotton; silk and cotton hosiery of every description; table-covers, carpets, &c.; woollen cloth, swanskins, blankets, shoe and glove leather; silk hats; ribbons and gloves; iron, steam machinery, wine casks; pottery, tiles, and bricks; glass, paper, cards; nails, plaster, and lime; cotton and woollen yarn; salt, soda. The commerce of the department consists of the various products already mentioned. About 100 fairs are held annually. The number of wind-mills and water-mills amounts to 754; iron forges and furnaces to 135; factories and workshops, of different kinds, to 526.

The department is divided into four arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1841
Nîmes . . .	11	72	134,737
Alais . . .	9	96	88,370
Uzès . . .	8	98	87,596
Le-Vigan . .	10	81	65,359
Total. . .	38	347	376,062

Of the arrondissement of Nîmes and of the whole department the capital is Nîmes or Nismes. *Aiguesmortes*, situated in an unhealthy spot among

marshes, at the junction of several canals before mentioned, presents the most perfect specimen extant of a feudal fortress. The walls, towers, gates, and ramparts are said to have been erected after the model of Damietta in Egypt; the fosse has been filled up. The population is now only 3393. The streets are wide and straight; within the walls there are large spaces, once covered with houses, which are now cultivated as fields and gardens. The most remarkable buildings are—the Tour-de-Constance, opposite the citadel and outside the walls, which served as a prison for the Protestants taken after the revocation of the Edict of Nantes; the Tour des Bourguignons, a tower in which the Burgundians, slain in defence of the town in Jan. 1421, were thrown between layers of salt to prevent the danger of miasma from their putrefaction, and the gate-tower, called La Carbonnière, to the north of the town. Soda, fish, and salt, which is made at the great salt-pans of Peccais, in the neighbourhood, are the chief articles of commerce. There is a lighthouse 65 feet high on the north-west mole of the Grau, which forms the harbour of Aiguesmortes. *Aramon*, prettily situated in a fine olive and fruit district on the right bank of the Rhône, to the E. of Nîmes, has 2751 inhabitants. BEAUCAIRE. *Bellegarde*, on the Nîmes and Beaucaire Railway, has 1796 inhabitants. *Calvisson*, a small town in a rich wine district, has important brandy distilleries, and 2660 inhabitants. A good deal of cream of tartar is made here, and the town gives name to a delicious claret. *St.-Gilles*, 12 miles S. from Nîmes, stands on the slope and at the foot of a hill above the canal from Beaucaire to Aiguesmortes, and has 5635 inhabitants. The most remarkable structure is the church of the ancient abbey of St.-Gilles, which dates from the 10th century. St.-Gilles gives name to the fine strong red wines of the neighbourhood, which are well fitted for exportation. The chief trade of the place is in these wines, and in brandy and spirits distilled in the town. *Marguerittes*, situated in a rich vine district, on the Vistre and the Nîmes and Beaucaire Railroad, has 1886 inhabitants. *Sommières*, 14 miles W. from Nîmes, on a hill on the left bank of the Vidourle, has important manufactures of woollens, swanskins, blankets, woollen thread, brandy, and leather, besides a good trade in wine, wool, &c. There are also several fulling-mills in the town, which has a population of 3697. *Vauvert*, 12 miles S.W. from Nîmes, has 4175 inhabitants, who manufacture silk, hosiery, brandy, spirits of wine, and saltpetre.

In the arrondissement of Alais, the chief town is ALAIS. *St.-Ambroix*, 12 miles N.N.E. from Alais, stands among the Cévennes Mountains on the right bank of the Cèze, and has iron smelting furnaces, zinc foundries, a silk factory, driven by steam machinery, and 3148 inhabitants, who trade in raw silk, olives, chestnuts, mulberry trees, wine, and coal which is mined in the neighbourhood. *Anduze*, W. of Alais, stands on the right bank of the Gardon-d'Anduze, between precipitous rocks on one side, and hills covered with vines and olives on the other. It is an ill-built place, but the environs present some enchanting scenery. The terrace, which serves as á dike against the inundations of the Gardon, and from the middle of which springs a cut stone bridge across the river, deserves mention. The population amounts to 5238, who manufacture silk, hosiery, silk hats, cloth, pottery, glue, and leather, and trade in cattle, raw and thrown silk, corn, &c. *Barjac* is situated near the northern boundary of the department, at the foot of the Cévennes, 20 miles N.E. from Alais, and has 2319 inhabitants. *Génolhac*, high up among the Cévennes in the north-west of the department, has 1586 inhabitants. *St.-Jean-du-Gard*, a few miles N.W. of Anduze, stands on the left bank of the Gardon-d'Anduze, and has 4192 inhabitants. It is an ill-built place, disfiguring the scenery that surrounds it, but it has important silk factories, breweries, and tan-yards. A manganese mine is worked near it. *Vézènobres*, a station on the Nîmes and Alais Railroad, has silk reeling establishments, and 1066 inhabitants.

Of the arrondissement of Uzès, the chief town *Uzès*, which stands 12 miles N. from Nîmes, among the mountains on the right bank of the Auzon, a feeder of the Gard, has a tribunal of first instance, a college, and 7274 inhabitants. It is built on a hill, from the base of which springs the fountain of Eure, or Aure, the waters of which were formerly conducted to Nîmes by an aqueduct. The most important buildings are—the court-house, the old castle of the dukes of Uzès, which is fortified, and greatly resembles the famous bastille of Paris, and the former cathedral. The inhabitants are engaged in the cultivation of the olive, and of the mulberry for the production of silk, and in the manufacture of silk-hosiery, coarse woollens, leather, and paper. The town trades also in corn, wine, brandy, oil, cattle, raw silk, &c. *Bagnols*, on the right bank of the Cèze, in a district famous for its wines, is an ill-built place with narrow streets, and 4909 inhabitants. There is one pretty square, ornamented with two fountains; the college buildings, the hospital, and the canal that draws off the waters of the Cèze for purposes of irrigation, deserve mention. Coarse cloth, serge, thrown silk, cards, brandy, and leather are manufactured. *Lussan*, 10 miles from Uzès, has 1078 inhabitants. *Pont-St.-Esprit*, well situated for trade, on the right bank of the Rhône, is an ill-built town, consisting of narrow, irregular streets, and defended by a citadel. The population amounts to 5239, and they carry on a considerable trade in wine, oil, fruit, silk, and provisions. The town, which is surrounded by ramparts, was anciently called St.-Savournin. It took the present name from the bridge which crosses the Rhône here, and which has resisted the impetuosity of that river since 1309, the year in which it was completed. It consists of 19 large and 4 smaller arches; the expenses of its erection were defrayed from the offerings given in a chapel dedicated to the Holy Ghost (Saint Esprit), whence the name. *Remoulins*, a small place of 1370 inhabitants, is situated near that portion of the magnificent Roman aqueduct, now called *Pont-du-Gard*. This aqueduct, which was constructed to convey the waters of the fountain of Eure to the city of Nemausus (Nîmes), spans a narrow

gorge between two arid hills on each side of the Gard. It consists of three arcades built one over the other, 656 feet long, and 173 feet high above the low-water mark of the river. The lower arcade consists of 6 arches, through one of which the Gard flows; the second is composed of 11 arches; and the third, which supports the canal of the aqueduct, of 35 arches. The whole structure, with the exception of the canal, which is 6½ feet broad and the same in depth, is built of large cut stones without cement. Between the Pont-du-Gard and Nîmes there is a portion of the aqueduct more than 7 miles long, which, being under ground, is still in perfect repair. Arrived at Nemausus, the waters were conducted by three branch aqueducts to the amphitheatre, to the public fountains, and to the supply of private houses. Several country houses also were supplied by conduits with water from the main trunk. *Roquemaure*, a town of 4471 inhabitants, stands in a rich wine district, on the right bank of the Rhône, which is here passed by a suspension bridge. It has silk-reeling factories, brandy distilleries, hydraulic saw-mills, and a great manufacture of wine casks, of which 20,000 are made annually. The trade of the place consists of the Rhône wines, brandy, horses, and cattle. *Villeneuve-les-Avignon*, stands on a hill on the right bank of the Rhône, opposite Avignon, of which it may be called a suburb, and to which it was formerly joined by a famous bridge. [Avignon.] The most remarkable structures are the former abbey of St.-André, now converted into a dwelling-house; the former Carthusian monastery; the church, which contains amongst other monuments the tomb of the Prince de Conti; and the public library. The population is 3671, who manufacture silk, linen, saltpetre, ropes, tiles, and lime.

In the arrondissement of Le-Vigan, the chief town, *Le-Vigan*, is beautifully situated at the foot of the Cévennes, 40 miles W. from Nîmes, and has a tribunal of first instance, a college, and 4938 inhabitants, who manufacture silk and cotton hosiery, white and shoe leather, and cotton yarn. It is well built, and is considered to be the prettiest and most salubrious town in the Cévennes. In the principal square there is a monument erected to the heroic D'Assas, who was a native of Vigan. *Alzon* and *St.-André-de-Valborgne* are small places S. of Vigan, with 1100 and 1820 inhabitants respectively. *St.-Hippolyte-du-Fort* E. of Vigan, on the Vidourle, is a modern town, which takes its origin from a fortress erected here in the 16th centnry. It is traversed by a canal which supplies several fountains, and turns a great number of mills. The town is well built, has a tribunal of commerce, and 5297 inhabitants, who manufacture cotton and silk stockings, woollen stuffs, glue, and leather. *Quissac*, further down the Vidourle, is a small place with 1590 inhabitants. *La-Salle*, a long straggling village on a feeder of the Gardon-d'Anduze, has 2354 inhabitants, who manufacture hosiery, silk, yarn, and leather. *Sauve*, a small place on the Vidourle, between Quissac and St.-Hippolyte, has 2808 inhabitants. Near it are the hot springs of Fonsange. *Sumène*, 8 miles from Vigan, has 2978 inhabitants, and some cotton manufactures. *Valleraugne*, a prosperous little town, with a population of 3853, is situated 10 miles N. from Vigan, in the best mulberry district of the department. A great deal of silk of the best quality is produced here.

The department forms the see of the bishop of Nîmes, is included in the jurisdiction of the Cour Royale, and University Academy of Nîmes, and belongs to the 9th military division, of which Montpellier is head quarters; it used to return 5 members to the Chamber of Deputies, it now has 10 representatives in the National Assembly.

(*Dictionnaire de la France; Statistique de la France; Decree of the Provisional Government of the French Republic.*)

GARDA, THE LAKE OF, the ancient *Benácus*, the largest of the Italian lakes, lies between the provinces of Brescia and Verona. Its south coast belongs to the province of Mantua; and its northern extremity enters the territory of Trent in the Tyrol. Its length is 30 miles, and its greatest breadth in its southern part is 11 miles, but at the northern end it is not 3 miles wide. It receives at its northern extremity the river Sarea and several other streams. The Mincio issues from its south-east extremity by the fortress of Peschiera. Some account of the territory along the banks of this lake is given under Brescia and Verona. The lake has some small islands near its west coast. (Quadri, *Prospetto Statistico delle Provincie Venete.*)

GARDEN. A garden, as distinguished from a farm, is a piece of ground designed for the cultivation of plants not actually indispensable to man for food. While corn for flour, various roots and herbs for the sustenance of cattle, or tracts of pasture land on which animals destined for slaughter are maintained, constitute the essential features of a farm,—a garden, even when exclusively occupied by culinary vegetables, is still a source of objects of luxury, not of first necessity; in a more extended sense, and as it usually exists at the present day, it is chiefly intended to gratify the senses, and to minister to the more refined enjoyments of social life.

The possession of a garden is one of the earliest indications of civilisation in man. It may be fairly considered that the taste for gardens has been at all times commensurate with the wealth of nations generally, their peaceful habits, and advance in the social relations of life.

The first great step that was made by gardeners to advance their art beyond mere mechanical operations was the invention of glass-houses, in which plants might be grown in an artificial climate, and protected from the inclemency of weather. Until this was effected, it is obvious that the cultivation of exotic plants in Europe, especially its northern kingdoms, must have been much circumscribed. Mr. Loudon refers the invention of greenhouses to Solomon de Caus, architect and engineer to the Elector Palatine, and who constructed the gardens at Heidelberg in 1619. But there can be no doubt that buildings of this description claim a higher antiquity. The specularia

of the Romans were certainly used for the purpose of forcing roses and some other plants; they were essentially greenhouses, although perhaps more like our garden-frames. Greenhouses certainly existed among the Italians in the middle of the 16th century, and there is no reason to suppose they had then for the first time been used, though they might probably have been without artificial heat. If heat was required, it would be supplied by stoves or such other means as were used for domestic purposes. Ray says, that in 1684 the greenhouse in the Apothecaries' garden at Chelsea was heated by means of embers placed in a hole in the floor; and it appears, from a section of a greenhouse in the Electoral Garden at Mannheim, published in 'Medicus Index Plantarum,' that a German stove was used there as late as 1771. We however agree with Mr. Loudon in considering the invention of glass-roofs for greenhouses to be an æra from which the principal part of modern improvements takes its date. This happened in 1717. Up to that time the want of light must have rendered it impossible to employ greenhouses for the growth of plants, either in winter or summer; they could only have been hybernatories, receptacles in which plants might be protected from wet or cold during winter, but from which they were transferred to the open air as soon as the spring became sufficiently mild. The substitution of glass-roofs, by increasing the quantity of light, put it at once in the power of the gardener to cultivate permanently in his greenhouse those natives of hot countries which are not capable of bearing the open air of Europe even during the summer. Since 1717 there has been a gradual improvement in the construction of greenhouses, the object being to supply the plants with as nearly the same amount of light when under the glass-roof as they would have had if in the open air. The modern invention of curvilinear iron roofs has accomplished this end in a most remarkable degree; for they substitute an obstruction to light amounting to only $\frac{1}{23}$ or $\frac{1}{27}$ for a loss equivalent to $\frac{1}{7}$ or even $\frac{1}{5}$.

The mode of heating such houses has given the modern cultivator additional advantages of the greatest importance. Stoves of all kinds not only dry up the moisture of the atmosphere, but impregnate the air with gaseous exhalations unfavourable to vegetation. In addition to these improvements, the rapid and uninterrupted communications now existing between all parts of the world has placed the plants of various climates within the reach of all those who take delight in their cultivation; and another important reason for the present flourishing condition of European gardens may be seen in the extension of the education of the working gardener. Great numbers of gardeners are now well informed in the higher branches of their profession. Instead of trusting to certain empirical rules, or to *receipts* for gardening operations, as if growing a plant was much the same thing as making a pudding, they make themselves acquainted with the principles upon which their operations are conducted; they acquire a knowledge of botany and vegetable physiology, and some even of physical geography; and thus they place themselves in the only position from which they can securely advance to the improvement of their art. The necessity of these subjects forming a part of all gardeners' education cannot be too strongly insisted upon; the Horticultural Society of London have recognised their importance by requiring all the young men in their garden to pass an examination in such subjects, in addition to their possessing the usual gardeners' acquirements.

Although the restoration of gardens took place among the nobles of Italy, and many noble instances of wealth and taste applied to such purposes still remain, yet the political condition of that country is unfavourable to horticultural pursuits; and, although there are gardens attached to most of the Italian cities, there are none of much note, except for their picturesque features and fine architectural embellishments. Those of Naples, Florence, and Monza, near Milan, are the most remarkable, especially the last.

The Dutch, although too much attached to the stiff formal style of clipped hedges, straight walks, and architectural puerilities, have always had a great reputation as gardeners. Their wealth and their commerce with the Cape of Good Hope and the East Indies, gave them for awhile extraordinary advantages over other nations. For a long time the Garden of Leyden was considered the richest in Europe, and there are few that surpass it at the present day.

In the Netherlands there are small public gardens, both at Antwerp and Ghent, and one of the finest in Europe at Brussels. It contains a range of hot-houses, 400 feet long, ornamented with a rotunda and porticoes, and an extensive collection of plants.

Among the German princes a taste for gardening has grown up in a degree unknown in any other country except among the English. A love of the beautiful, a fondness for natural objects, a quiet contented character, so characteristic of the German nations, has no doubt been the cause of this. The most remarkable are those of Munich, Berlin, and Vienna.

Rivalling these imperial structures are the gardens of St. Petersburg, founded by the Emperor Alexander on Apothecaries' Island in the Neva. In a country with such a climate as Russia gardening can hardly exist except under glass roofs, and it is necessary to call in aid all the resources of art in order to overcome the difficulties of nature. It is not surprising, then, that in this situation the glasshouses should exceed in extent those of all other parts of Europe. Altogether there are 3624 feet of such buildings, forming a double parallelogram, the principal sides of which are 700 feet long and from 20 to 30 feet wide. The middle range is 40 feet high in the centre.

In France gardening has never been in a very flourishing condition; it is true that great quantities of vegetables are raised for the market, that the fruits of France are justly celebrated for their excellence, and the flower-markets of Paris are well supplied; it is also true that numerous excellent works on gardening have been written in France. But for the quality of their fruit the

French are chiefly indebted to their climate, for the abundant supply of the vegetable market, the demand occasioned by their peculiar cookery, and for the excellence of their written works to a few clever men than to the general habits of the community. In flowers their taste is rather that of the Romans than of other European nations, for they are contented with a few showy kinds of sweet-smelling flowers, especially roses. The Garden of Plants at Paris, which is the largest of the public establishments in France to which the name of garden properly applies, is not an exception to this statement, so far as the plants it contains are concerned, and there are few judges of gardens who would assign to it a place among the first class of European gardens.

The chief English garden containing a large collection of plants is that of Kew, which is certainly the richest in the world in New Holland plants, and which was, during the late war, almost the only place in Europe to which exotic plants were introduced in considerable quantity. In consequence of this establishment having had the sole support of the government for above 30 years, it has been the channel through which an enormous quantity of new plants have been introduced to Europe from all parts of the world. For many years however it was unworthy of the nation, from the illiberal manner in which it was conducted. Of late years however this system has been abandoned, a liberal management has been introduced, and the collection is as accessible as that of other nations, and the recent erection of a magnificent range of glass houses and other improvements add greatly to the value and attraction of the gardens. Next in importance among public gardens is that of the Horticultural Society, at Chiswick, near London. It was established at the expense of the members of the society, and was intended both as a place of experimental researches in horticultural science, and as a station whence the most valuable, useful, and ornamental plants of all kinds might be distributed through the country. It is moreover conducted as a kind of normal school for young men intended for gardeners, who are now obliged to pass an examination in the principles of their business before they are recommended to places.

The botanic garden of Edinburgh is one of the finest and best managed in Europe. It consists of 16 acres, delightfully situated, and includes everything that can be required for the purposes of teaching. The houses are remarkably good, and the healthy condition of the plants deserving of all praise. It is particularly celebrated for its beautiful specimens of heaths. Besides these, there are botanic gardens at Glasgow, Liverpool, Cambridge, and Oxford; fine public gardens in the towns of Sheffield, Manchester, and Birmingham; and a garden at Chelsea, belonging to the Apothecaries' Company, who maintain it for the use of medical students of the London schools.

GARDEN HUSBANDRY is a branch of Horticulture, the object of which is to raise fruits, vegetables, and seeds for profit on a smaller extent of ground than is usually occupied for the purpose of agriculture.

The best examples of this kind of industry are found among the market-gardeners near populous towns, particularly London, Paris, and Amsterdam. By the application of much manual labour and an abundant supply of manure, they greatly accelerate the growth of vegetables.

The market-gardens near London, which chiefly supply Covent Garden market, have a soil which is a moist alluvial loam deposited from repeated overflowings of the Thames, which are now prevented by banks or dykes. The gardener's year properly begins in autumn, when the land is dug, or rather trenched, and well manured. Various vegetables which will be required in winter are now sown, and especially those which are to produce plants to be set out in spring; spinach, onions, radishes, and winter salads are sown, and, when the weather is severe, are protected by a slight covering of straw or mats. In February, the cauliflowers which have been raised in frames or under hand-glasses are planted out. The cabbage plants are pricked out. The radishes, onions, and salads go to market as soon as they are of sufficient size, and sugar-loaf cabbages succeed them. As the cauliflowers are taken off, they are succeeded by endive and celery, and the same is the case with the cabbages. Thus there is a constant succession of vegetables, without one moment's respite to the ground.

The principle on which the gardens are cultivated is that of forcing vegetation by means of an abundant supply of dung, constant tillage, and occasional watering. The whole surface is converted into a species of hotbed; and crop succeeds crop with a rapidity which is truly astonishing. Those vegetables which arrive at a marketable state in the least time are always the most profitable, and those also for which there is a constant demand at all times of the year. With an abundant supply of manure, the market-gardeners have no fear of exhausting the soil; and dissimilar vegetables may grow together on the same ground. Raspberries, gooseberries, and currants are planted in the rows between fruit trees; which rows being thirty or forty feet apart leave ample room for vegetables. The market-gardeners near London do not raise many peas or beans, except such as are forced and require glass frames to protect them. The chief supply of peas in the season comes from a greater distance, and is the produce of whole fields sown for that purpose by the farmers within a moderate distance of London. An acre of the richest garden ground near London is said to yield produce valued at 220*l.* in a year.

A garden should always be laid out in a regular form, with narrow parallel beds, and paths between them. One or more roads, of sufficient width to allow a cart to pass, should intersect these beds at right angles, for the convenience of bringing manure and taking off the produce. The beds should not be above six feet wide; so that a person may easily pull up weeds, or gather the vegetables without treading upon the beds. For early plants, and those which are used in winter, and require to be protected from frost, narrow beds are made lying in a direction east and west, and sloping towards the south, with the north side

raised high, so that their surface forms an angle of twenty or thirty degrees with the horizon. In very frosty weather, these beds are covered with mats or loose straw.

An abundant supply of manure is indispensable in a market-garden, and this can generally be obtained in large towns at a trifling expense. The neighbourhood of a town is therefore a necessary circumstance towards the production of the crop, as well as its sale.

The profits of a garden near London, of the extent of ten or twelve acres, are as great as that of a farm of ten times the extent cultivated in the best manner, without the help of purchased manure. But if manure can be obtained at a reasonable rate, as is often the case in great thoroughfares, where many horses are kept for public conveyances, although there be no immediate demand for vegetables, a garden may be very profitably cultivated entirely for the purpose of raising seeds. This branch of industry is the more worthy of notice, as it may enable a cottager to improve his situation greatly by the produce of a small garden or allotment of land.

In some agricultural districts it is the custom for the labourers to plant turnips in their gardens in November, in order to obtain the seed in time for sowing in the next year. An industrious cottager, without losing any time, with the help of his wife and children, may much increase his comforts in this manner, while at the same time he trains his children to habits of industry. To no class of men would a knowledge of garden husbandry be more useful.

Many plans have been proposed for the distribution of the crops in a cottage garden; but none of them are suited to every situation. Much depends on the nature of the soil, which may be better suited to one kind of produce than another, and also to the demand for any peculiar class of vegetables. The practice of the market-gardeners may be examined with advantage; and long experience, with the test of profit, will lay down better practical rules than the most plausible theories.

An allotment of land such as is now very frequently given to agricultural labourers, with the laudable intention of making them more industrious and independent of parochial relief, may be cultivated to great advantage by applying judiciously the general principles of garden husbandry. There are few cottages which have not already attached to them a small garden of a few perches, in which common vegetables, such as cabbages, onions, and early potatoes are raised. But the remainder of the allotment should be cultivated on a regular plan, as a farm in miniature, with this difference, that all the operations should be performed with the minute attention of a gardener. Potatoes and wheat, if the soil is not too light for the latter, or rye, in very sandy soils, will be the principal crops, being immediately necessary to the support of the family.

GARDE'NIA, a genus of plants belonging to the natural order *Cinchonaceæ*. *G. campanulata* is a shrub 5 to 10 feet in height, and is a native of the East Indies, in the forests of Chittagong. The berry is about the size of a golden pippin apple, and is employed by the natives of India as a cathartic and anthelmintic. *G. arborea* is a native of the East Indies. The fruit is eaten by the natives of India. It is one of the most beautiful species of the genus, and deserves a place in every collection.

There are about fifty species of *Gardenia*, which all bear elegant sweet-scented flowers. They thrive best in a mixture of loam, peat, and sand. Under the name of Cape Jasmines, double-flowered varieties of *G. florida* and *G. radicans* are extensively cultivated. Their flowers are very fragrant, and the best way of getting them to bloom freely is to set them in a close frame with a gentle bottom heat in the spring. In the winter they may be placed in the greenhouse. They may be increased by cuttings.

(Lindley, *Flora Medica*; Don, *Gardener's Dictionary*.)

GARDINER, STEPHEN, was believed to be the illegitimate son of Dr. Woodvil, bishop of Salisbury, who, being brother to Elizabeth, Edward IVth's queen, was also related to Henry VIII. He was born at Bury St. Edmund's in 1483, and studied at Trinity Hall, Cambridge. Through his intimacy with the Duke of Norfolk, whilst Master of Trinity Hall, he became secretary to Wolsey, and was thus introduced to the king, who rapidly took him into favour. Dr. Stephens (as Gardiner at this time was usually called) was sent to Italy in 1527, to procure the Pope's consent to the divorce of Catherine of Aragon. In this he failed. He showed policy however by promoting the interests of Wolsey as a candidate for the papal throne. He was recalled from Rome to manage the process for the divorce; and, as he was esteemed the most learned man of his time in the canon law, the king would commence no proceedings until he returned. He was then made secretary of state, and, having in the spring of 1531 been further advanced to the archdeaconry of Leicester, was installed bishop of Winchester in the following November. After some time spent in embassies to France and Germany, he entirely engaged in opposition to such measures as were intended to procure a religious reformation in England. The king listened to his advice, the reformers were obstructed, and Lambert and others condemned and executed for heresy. In 1538 he promoted the act of the six articles, and urged its subsequent enforcement. The decline of Cromwell's power tended to the increase of Gardiner's. They had been at the same time in the service of Wolsey, and now stood in direct opposition to each other. After Cromwell's execution in 1540, Gardiner used all possible means to obtain the king's favour, and did not hesitate to aid him in the business of the divorce from Anne of Cleves. Still Henry did not wholly trust him. Cranmer enjoyed the king's friendship, and in consequence, when Gardiner and the Roman Catholic party attempted to convict Cranmer of heresy, the conspiracy signally failed. His next attempt was against Queen Catherine Parr, who favoured the reformers, and had thus offended Henry. But, at the very time she was to be arrested, she acted with

such tact and courage that she completely turned her husband's mind, and from that day Gardiner lost the royal favour. When Edward the Sixth ascended the throne, Gardiner's conduct was more creditable to him, though equally unpopular. He condemned strongly the religious changes then made, and which were all in favour of the advancing reformation. He was accordingly imprisoned in the Fleet prison, and remained there till the amnesty, which was passed the year after Edward's accession, relieved him. But he was again arrested on account of a sermon preached on St. Peter's Day, 1548, and imprisoned in the Tower. After various conferences, and his refusal to sign the articles submitted to him, he was deprived of his bishopric, and left in prison until Mary came to the throne in 1553. His bishopric was then restored to him, he was made chancellor, and the national affairs were intrusted to his guidance. His power became scarcely less than Wolsey's had been. How it was used in persecution of the reformers is well known. He died on the 12th of November, 1555.

GARFAGNA'NA is a highland district of the northern Apennines, on the borders of the states of Tuscany, Genoa, and Modena, including the valley of the Upper Serchio above its junction with the Lima. The valley extends from the sources of the Serchio in a south-east direction for about 24 miles between the main ridge of the Apennines and the lofty group called Alpe Apuana, the summits of which rise to the height of 6000 and 7000 feet. The climate of Garfagnana is cold and foggy, and exposed to boisterous winds from the mountains. The inhabitants amounted in 1832 to 40,160. The low lands produce corn, hemp, and flax, and in some sheltered spots the olive and mulberry; but the main resource of the people is their pastures and their forests of chestnut-trees, the fruit of which is to them a substitute for bread. They export silk, cheese, undressed skins, chestnuts, wool, and timber. There are iron and coal-mines. Garfagnana was divided into 6 jurisdictions, 3 of which belonged to Modena, 2 to Lucca, and 1 to Tuscany, until May 19, 1848, when they were all incorporated with Tuscany. The principal towns are—1, Castelnuovo, which has 3000 inhabitants, and was the residence of the Modenese governor; 2, Gallicano, with about 1000 inhabitants, the head place of the Lucchese district; 3, Barga, with 2500 inhabitants, head town of the Tuscan district.

GARLIC, a hardy perennial plant with bulbous roots, found growing wild in the island of Sicily, and in several other parts of the south of Europe. In gardens it is cultivated chiefly on account of its bulbs, which are much used in cookery, and occasionally in medicine.

Garlic is the *Allium sativum* of botanists, and is regularly grown for the market. [ALLIUM.] For this purpose, a light tolerably rich soil is selected in a dry warm situation. The ground should be well dunged for the crop which precedes garlic; and not when the garlic is planted, because, when this is done, the bulbs are very apt to canker and to be infested with maggots. The plant is propagated by offsets, which it produces annually in considerable numbers, and which are commonly called cloves. The season of ripeness, which is generally in the end of July or August, is easily known by the leaves changing from green to yellow. At this period the bulbs should be taken up and spread out in the sun to dry, after which they may be tied in bunches and kept in a dry house for winter use, in the same way as onions.

GARNET, a well-known precious stone, of which there are many varieties. Some of them are probably distinct species; but, agreeing in form and some other properties, they are classed together. This mineral occurs crystallised, massive, and granular. The primary form is a cube, but it occurs in the form of a rhombic dodecahedron. The crystalline varieties, according generally to their colour, have received various names. Precious garnet, *Almandine;* black, *Melanite, Pyreneite;* greenish yellow, *Grossularia;* yellow, crystallised, *Topazolite;* granular, *Succinite;* brownish yellow, granular, *Colophonite;* greenish, compact, *Allochroite;* red, *Pyrope, Carbuncle;* reddish brown, *Essonite, Cinnamon-stone, Romanzovite;* magnesian, *Rothoffite.* Almandine consists of silica, 42.5; alumina, 19.0; oxide of iron, 33.5; oxide of manganese, 5.0.

GARNET, HENRY, the son of a schoolmaster at Nottingham, was born about 1554, and educated as a Protestant at Winchester College. He next became a corrector of the press in London. Having turned Roman Catholic, he entered the society of Jesuits, and studied in their college at Rome with such distinction, that in 1586 he was appointed to the English mission, and in 1588 made Superior of the English Jesuits. Before the death of Queen Elizabeth, he had engaged in treasonable intrigues with the King of Spain, and, to protect himself, purchased a pardon on the accession of James I. In September 1605, he undertook a pilgrimage to St. Winifred's Well, in Flintshire, and with him were some of the persons who were seized two months later as the conspirators in the Gunpowder Plot. Garnet and another Jesuit, Oldcorne, were arrested at Hendlip Hall, near Worcester, in one of the secret hiding-places with which that mansion abounded, and were conveyed to the tower of London. A bill of attainder had been passed by parliament against Garnet and others for their proceedings with Spain; but it was now determined to proceed against them as conspirators in the Powder Plot. Oldcorne was tortured; Garnet and he were brought secretly and treacherously together, and their conversation reported; and in the end they were tried, found guilty, and executed. Garnet was hanged in May 1606, in the city of London. Both were considered martyrs by the Roman Catholic Church. An account of Garnet's trial is given in 'Criminal Trials,' vol. ii. ('Library of Ent. Knowledge.') The romantic attachment of Anne Vaux, daughter of Lord Vaux, who devotedly followed Garnet's fortunes, is a singular episode in Garnet's extraordinary history.

GARNIER, JEAN JAQUES, was born in 1729, in the province of Maine, of poor parents, who gave him however a superior education. Without money or interest, at the age of eighteen,

he travelled on foot to Paris, where a happy chance obtained him the acquaintance and patronage of the sub-principal of the college of Harcourt, who procured him a situation in the college. About 1760 he was appointed professor of Hebrew at the College de France, of which he afterwards became inspector. On the death of Villaret in 1766 he was appointed historiographer of France, in which capacity he published in 1770 the 9th volume, in 4to., of Velly and Villaret's 'History of France,' beginning with the year 1469. Continuing his labours on this work, he produced the 13th volume, which brings the history of France down to the middle of the reign of Charles IX. He was also the author of various other works. Garnier died in 1805 at the age of 75.

GARO'FALO, the name by which *Benvenuto Tisio* is commonly known, apparently from his adoption of a gilliflower (garofalo) for his monogram. He was born in the Ferrarese in 1481, and was first instructed in design by Domenico Pannetti, from whom he went to his uncle, Niccolo Soriani, at Cremona. After the death of his uncle in 1499, he left Cremona, and repaired in 1500 to Rome, where he remained fifteen months with Giovanni Baldini, and, after visiting several other cities, he spent two years with Lorenzo Costa at Mantua; he then dwelt for a period of four years in Ferrara, and finally, in 1508, engaged himself with Raphael in Rome, where he spent some years. Garofalo, though the most distinguished of the Ferrarese painters, belongs to the Roman school. For Raphael he had an enthusiastic veneration, and made him his exemplar. Two of his small pictures are in the National Gallery of London. In some points of colour he excelled his master, but his execution is dry, and, as a whole, his pictures want harmony. He died in 1559, having been for the last few years of his life quite blind.

GARONNE, a river in the south-west of France, rises in the Val-d'Aran, near the foot of Mount Maladetta, in the Spanish Pyrenees, and enters France at a place called Pont-du-Roi, in the department of Haute-Garonne. From this point it runs N. past St. Béat to Montrejeau, where it is joined on the left bank by the Neste; its course is then easterly as far as St.-Martory, where the Salat enters it on the right bank. Hence turning N.E. it passes Cazères, where it becomes navigable; between this place and Toulouse it receives the Louge on the left bank; the Volp, the Arize, and the Ariège, on the right. At Toulouse it is joined by the Canal-du-Midi, and turns N.W., in which direction it continues generally to its mouth, passing Verdun, Agen, St.-Macaire, and Bordeaux, a few miles below which, at Bec-d'-Ambès, it enters the æstuary of the Gironde. Its principal feeders below Toulouse are the Giron, the Tarn, the Lot, and the Dropt, on the right bank; the Save, the Gimone, the Gers, the Baise, the Avance, and the Ciron, on the left.

The length of the Garonne is about 352 miles, of which 262 are navigable; it communicates either directly or by its navigable feeders with 12 departments, the total river navigation of its basin being about 1000 miles. The tide ascends to St.-Macaire, and vessels of the largest size go up as far as Bordeaux. [BORDEAUX.] By this river and the Canal-du-Midi the Bay of Biscay is united to the Mediterranean.

The basin of the Garonne is bounded S. by the Pyrenees, E. by the Cévennes, N. by the Auvergne Mountains and their western offshoots, and W. by ramifications of the Pyrenees, which extend to the mouth of the Gironde. Its length from S.W. to N.E. is about 200 miles, its breadth about the same; in its lower part however the basin (including therein the Gironde) does not exceed 25 miles in width. The valley of this river is remarkable for the richness of its products, and for the beauty of its scenery.

The *Gironde*, formed by the junction of the Garonne and the Dordogne, runs N.W. and connects those rivers with the Bay of Biscay. From Bec-d'-Ambès to its mouth the channel of the Gironde presents a succession of islets and banks, which nearly divide it into two equal branches, and render the navigation somewhat intricate. Its length is about 40 miles; its breadth at Bec-d'-Ambès is about a mile and three quarters; its greatest width is 7 miles; at its entrance into the Bay of Biscay the breadth is scarcely 3 miles. Its shores below Blaye are uninviting, and present to view only bare rocks and dreary heaths. This æstuary is subject to the *mascaret* or bore. [BORE.] The crest of the bore rises from 13 to 16 feet above the surface of the river; and this great mass of water, moving along with impetuous velocity, often causes serious damage to vessels exposed to its violence, not only in the Gironde, but also in the Dordogne, which river it ascends for about 20 miles.

(*Dictionnaire de la France.*)

GARONNE, HAUTE, a department in the south of France, formed out of a portion of Haut-Languedoc, and that part of Gascogne called Comminges, is bounded N. by the department of Tarn-et-Garonne; N.E. and E. by those of Tarn, Aude, and Ariège; S. by the Pyrenees, and W. by the departments of Hautes-Pyrénées and Gers. Its greatest length from N.E. to S.W. is 100 miles; its greatest breadth is 63 miles. The area is 2388 square miles; the population, in 1841, was 468,153, which gives 196.04 to the square mile, being 28.03 above the average per square mile for all France.

The south of the department is covered with lofty mountains, forming the principal range or the branches of the Pyrenees, the peaks of which rise in many places in this department, or just close to it, from 9000 to 11,742 feet high. The last number expresses the height of Mont Maladetta, from the snows of which the Garonne springs. The lower slopes are covered with thick forests of oak, pine, fir, &c., or are occupied as sheepwalks or pasture-grounds. The mountains are diversified by beautiful lakes and cascades, and intersected by lovely valleys, such as that of Luchon. The lake and cascade of Oo, near the village of Oo, at the extremity of the valley of Larboust, are among the finest sights in the Pyrenees; the cascade, which is broken about midway in its descent, has a total fall of 1600 feet. The scenery higher up the mountains is of the most savage

description; large glaciers are met with here. The communication with Spain is kept up by the depressions in the mountains, here called *ports*. The Port d'Oo, the loftiest pass in the Pyrenees, is 9850 feet high. The north of the department is occupied by hills of moderate elevation, separated by extensive and very fertile plains.

The department belongs entirely to the basin of the upper Garonne, from which river it takes its name, and which traverses it from south to north. Of the other rivers, the principal are the Neste, the Salet, the Ariège, the Lers, the Louge, the Touch, the Save, the Gimone, and the Tarn; these are all directly or indirectly feeders of the Garonne. [GARONNE.] The department is traversed by the Canal du Midi, by 7 royal, 31 departmental, and 30 parish roads.

The mineral treasures of the department are iron, copper, lead, antimony, bismuth, zinc, coal, rock-crystal, slates, gypsum, marble, jet, and granite. Gold is found in the sands of the Garonne and the Salat. There is a salt spring at Salies. Mineral waters are found at various places; those of Bagnères-de-Luchon are the most celebrated.

In the higher parts of the mountains the winters are severe and long; in the lower hills and plains, which make up the greater part of the department, the climate is mild; it rarely freezes, and a fall of snow is almost unknown. The average number of rainy days in the year is about 100; the rest of the year is dry, and almost equally divided between bright sunny and cloudy weather. The east and west winds predominate; the latter bring cold and rain. Tempests are frequent and violent. Goitres are common among the mountaineers.

In the mountainous tracts it is only by dint of industry that any returns can be procured by the farmer. The valleys are very productive. The most fertile localities are the plain of Toulouse, the productiveness of which is noticed by Julius Cæsar ('De Bel. Gal.,' i. 10); the valley of the Garonne generally; and the neighbourhood of Rieux, in the valley of the Arize, where two harvests are obtained in the year. The department contains 1,528,545 acres, distributed among 129,754 proprietors, and into 1,120,797 parcels. Of this surface, 868,875 acres are arable; 95,477 are grass land; 120,858 are under vineyards; 275,357 under woods and forests; 13,853 are orchards, plantations, and gardens; and 114,142 heath and moor land; and 11,654 are covered with waters, ponds, and canals.

The arable land is well adapted to the cultivation of wheat, maize, buckwheat, millet, rye, and other grains and pulse. A great deal of garlic is grown; flax, hemp, potatoes, chestnuts, tobacco, truffles, melons, orange flowers, fruit-trees, and medicinal plants are also produced. The quantity of wine grown in the department is 14,300,000 gallons, one-third of which is used for home consumption. The quality is generally inferior. The uplands and the valleys furnish abundance of excellent pasture; the mountains abound with wood suited for ship-building. Many oxen are bred in the extensive pastures of this department; asses, mules, sheep, and swine are numerous. Poultry is abundant. The geese and ducks are plentiful, and of great size; numbers of them are salted for household use and for exportation. A little honey and silk are produced. In the mountains there are the wild boar, the roe-buck, the wolf, the fox, the heath-cock, and different varieties of the eagle. The partridge, ortolan, and quail are taken in abundance in the plains. The rivers and lakes abound with fish.

The commerce of the department is composed of the products already named, and of its manufactures, the chief of which are scythes, files, copper utensils, mathematical instruments, porcelain, pottery, tiles, coarse woollens, canvas, blankets, calico, tape, brandy, tin-ware, and leather of various kinds. There are 78 iron furnaces, and 331 factories of different kinds, including glass works, copper foundries, cannon foundries, gunpowder mills, tobacco factories, distilleries, marble sawing works, &c., and 1053 wind and water mills. The department has considerable commercial intercourse with Spain, whither many handicraftsmen annually emigrate to exercise their callings. Fairs to the number of 360 are held in the year.

The department is divided into 4 arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1841.
Toulouse . .	12	138	171,243
Villefranche .	6	99	63,712
Muret . . .	10	132	89,082
St.-Gaudens .	11	238	144,116
Total . .	39	607	468,153

Of the arrondissement of Toulouse and of the department, TOULOUSE is the capital. *Cadours*, a small place N. of Toulouse, has 1002 inhabitants. *Castanet*, on the Canal du Midi, is a neat little town with a population of 1156. *Fronton*, in the north of the department, is a well-built town consisting entirely of brick houses, and has 2141 inhabitants. *Grenade-sur-Garonne* stands 15 miles N. from Toulouse, on the left bank of the Save, a little above its confluence with the Garonne, and has 4281 inhabitants. It is a regular brick-built town, situated in a rich corn country, and has manufactures of coarse woollens, serge, and leather. *Montastruc*, 10 miles N.E. from Toulouse, has 1073 inhabitants. *Verfeil*, 12 miles E. from Toulouse, has a population of 2420. *Villemur-sur-Tarn*, the most northern town in the department, stands on the right bank of the Tarn, which is here passed by a suspension bridge, and has a population of 5472.

In the arrondissement of Villefranche, the chief town, *Villefranche-de-Lauragais*, stands in a vast plain of great fertility on the Lers, near the Canal du Midi, and has a population of 2805. It is the seat of a tribunal of first instance, and has manufactures of sailcloth, hosiery, blankets, pottery, and leather. *Caraman*, N. of Villefranche, has a population of 2572. *Lanta*, W. of Cara-

man, has 1715 inhabitants. *Montgiscard*, on a height above the Canal du Midi, is a small place with a population of 1260. *Nailloux*, 7 miles from Villefranche, has 1367 inhabitants. *Revel*, in the north-eastern angle of the department, stands on a hill which commands a fine view over a very fertile country. It has 5796 inhabitants, who manufacture stockings, hats, linen, liqueurs, cotton yarn, tiles and leather.

In the arrondissement of Muret the chief town, *Muret*, is situated on the slope of a hill above a beautiful valley at the confluence of the Louge with the Garonne, which is here passed by a fine suspension-bridge. It is a pretty brick-built town with a tribunal of first instance, and 4000 inhabitants, who manufacture coarse woollens, delf, and leather. *Auterive*, a town of 3272 inhabitants, who manufacture cloth for soldiers' uniforms, stands on the right bank of the Ariège, which is here navigable and passed by a brick bridge. *Carbonne*, on the left bank of the Garonne, opposite to where that river is joined by the Arize, is a pretty little town with a population of 2293, who manufacture cloth and bricks, and trade in oil and wool. *Cazères* on the Garonne, which here becomes navigable, is a well-built town with 2471 inhabitants. It has tanyards, dyehouses, and hat factories. *Cintegabelle*, at the junction of the Lers and the Ariège, has 4016 inhabitants. It is a place of some commercial activity; the iron and other products of the department of Ariège are put aboard river-craft here, the Ariège being navigable from this point. *Le-Fousseret*, the birth-place of the Abbé Sicard, W. of Carbonne, has a population of 2046. *St. Lys*, W. of Muret, has 4000 inhabitants, who manufacture linen, and trade in charcoal. *Montesquieu-Volvestre*, situated on a height close to the canal du Midi, has 3745 inhabitants, and some manufactures of woollens, drugget, saltpetre, and tiles. *Rieux*, a well-built town, formerly the seat of a bishop, is prettily situated on the Arize, has a fine church, manufactures of cloth and hats, and 2128 inhabitants. *Rieumes*, W.S.W. of Muret, is a small place with 1801 inhabitants.

In the arrondissement of St. Gaudens, the chief town *St.-Gaudens*, situated on a hill on the left bank of the Garonne, has a tribunal of first instance, a college, a very ancient church, and 5459 inhabitants who manufacture paper, leather, glass, delf, tiles, woollen stuffs, tape, &c. The town has several flour, oil, and fulling mills, and trades with Spain in corn, nails, linen yarn, mules, cattle, &c. From the Esplanade along the river there is a fine view of the scenery of the Pyrenees and the valley of the Garonne. *Aspet*, S.E. of St. Gaudens, stands near the torrent of Souheil, in a most picturesque situation among frowning rocks, smiling valleys, and rich pastures; it has iron factories, manufactures of nails, combs, &c., and a considerable trade with Spain in pigs. The population is 2573. *Aurignac*, on a hill above the Louge has 1525 inhabitants, who manufacture woollen stuffs and leather, and trade in hides, wool, and cattle. BAGNE'RES-DE-LUCHON. *St. Béat*, near which there are white marble and slate quarries, stands on the Garonne and in a defile through which that river flows on leaving the Val-d'Aran. The town is small, consisting of two streets on opposite sides of the river, and united by a stone bridge; the population is 1374. *St.-Bertrande-de-Comminges*, a village of under 1000 inhabitants, stands on the site of the ancient *Lugdunum Convenarum*, near the left bank of the Garonne. It was formerly the seat of a bishop; the former cathedral is a large and interesting structure. There are famous marble quarries and marble works near this town. *L'Ile-en-Dodon*, famous for its poultry, stands in an island formed by the Save, and has 1818 inhabitants. *St.-Martory*, a picturesque little town at the junction of four high roads on the Garonne, which is here crossed by a fine bridge, has 1147 inhabitants. *Montrejeau*, beautifully situated on a plateau at the foot of the Pyrenees, and near the junction of the Neste with Garonne, is a neat and well-built town with 3081 inhabitants. The magnificent scenery of the Pyrenean Mountains, contrasts beautifully with the smiling landscapes and rich valleys watered by the two rivers in the neighbourhood of this town. A fine marble bridge of six arches crosses the Garonne here. Stockings and leather are the leading manufactures of the town, which trades also in corn, cattle, mules, poultry, timber, oak-staves, &c. *Salies*, is a small place on the Salat, over which a suspension-bridge is thrown. There is a fine salt spring near it.

The department forms the see of the Archbishop of Toulouse and Narbonne, is included in the jurisdiction of the Cour Royale and of the University Academy of Toulouse, and belongs to the 10th Military Division, of which Toulouse is headquarters. It used to return 6 members to the Chamber of Deputies; it now has 12 representatives in the National Assembly.

(*Dictionnaaire de la France; Statistique de la France; Decree of the Provisional Government of the French Republic.*)

GARRICK, DAVID, descended from a French Protestant family of the name of Garrique, was born Feb. 20, 1716, at Hereford. His father was a captain in the army, his mother the daughter of a vicar of Lichfield Cathedral. At the age of eleven he performed Serjeant Kite, in Farquhar's comedy of the 'Recruiting Officer.' He was first educated at the grammar-school of Lichfield; subsequently, in 1735, he became the pupil of Samuel Johnson. With him, in 1736, Garrick came to London, where he entered the Society of Lincoln's Inn. On the death of his father he commenced business with his brother Peter as wine merchant; the partnership however was soon dissolved. In 1741 David Garrick finally resolved to adopt the profession towards which his desires had so long tended: he then made his first appearance on the stage at Ipswich, under the name of Lyddal. The character chosen was Aboan, in the tragedy of 'Oroonoko.' His success was decided; and in all departments—tragedy, comedy, and even pantomime, in which he played harlequin. The manager was then proprietor of the theatre in Goodman's Fields, London. There Garrick made his first metropolitan attempt in Richard III., on the 19th of October, 1741. Before many weeks elapsed, the

chief theatres were deserted, and persons of all condition were flocking to see the new actor. He performed three nights at the close of the season at Drury Lane in 1742. He then went to Dublin, where his reception was enthusiastic. In 1745 he joined Mr. Sheridan in the management of the Theatre Royal, Dublin. On the 15th of September, 1747, he opened the Covent Garden Theatre, London, as joint patentee with Mr. Lacy, and spoke the well-known prologue by Dr. Johnson. On the 22nd of June, 1749, he married Eva-Maria Violette, the daughter of a citizen of Vienna. She had first appeared at Drury Lane as a dancer in 1746. On the 7th of September, 1769, Garrick carried out his favourite scheme of the Shakspere Jubilee at Stratford. And at last, after twenty-seven years of active management of Drury Lane, he took his leave of the stage on June 10, 1776, in the character of Don Felix, in 'The Wonder,' the performance being for the benefit of the fund for decayed actors. In 1777 he was put into the commission of the peace. He died at his own house in the Adelphi, January, 20, 1779, and was buried with great pomp in Westminster Abbey, on the 1st of February following. As an actor, Pope's words to Lord Orrery sum up all that need be said—'That young man never had his equal as an actor, and never will.' As a literary man he also exhibited some ability. He wrote verses, prologues, and epilogues, altered and adapted many plays, and wrote some original works. Of the last his farce of 'The Lying Valet,' and his share with Colman in 'The Clandestine Marriage,' are well known. Mrs. Garrick died at the age of ninety-eight, on the 16th of October, 1822, being then in full possession of her faculties.

GARRYA, the only genus and type of the natural order of incomplete plants *Garryaceæ*. It was named by Mr. Douglas in compliment to Nicholas Garry, Esq., secretary to the Hudson's Bay Company. The species are shrubs, natives of California and Mexico. Only two species of this genus have been introduced into Great Britain; they are very ornamental, and grow best in a loamy soil, and may be propagated by layers.

G. elliptica, the Elliptic-Leaved Garrya, has, when young, soft, pubescent, purplish branches; when older, they become smooth and grayish. When in bloom, this shrub presents a striking and beautiful appearance, with its delicate pendulous catkins, which are from 8 inches to a foot in length. It is easily cultivated in our gardens and is as hardy as the common laurustinus. *G. laurifolia* is an evergreen shrub or low tree, and grows on the mountains of Mexico. According to Loudon, there is but one specimen of this very beautiful and desirable shrub preserved in the garden of the Horticultural Society. It was brought over in the year 1839.

GARRYA'CEÆ, a very small natural order of Exogens with the habit of a *Viburnum*.

GARTER, ORDER OF THE, one of the most ancient and illustrious of the military orders of knighthood in Europe, was founded by King Edward III. in 1350, according to Stowe. The story of the Countess of Salisbury dropping her garter at a ball, the picking it up by the king, and his word in reproof to the smiling countess, *Honi soit qui mal y pense*, which afterwards became the motto of the order, are well known; but the tradition is doubtful.

The order was founded in the names of the Holy Trinity, the Virgin Mary, St. George, the tutelar saint of England, its especial patron, and St. Edward the Confessor. It originally consisted of the king, and twenty-five knights named by him. George III. increased the number by directing that princes of the royal family and illustrious foreigners should be considered as additional to the twenty-five. The military knights of Windsor are also considered an adjunct of the Order. Its officers are—as prelate, the Bishop of Winchester; as chancellor, the Bishop of Oxford; as registrar, the Dean of Windsor; Garter Principal King-at-Arms; and a gentleman usher of the black rod. Installations of new members take place in St. George's Chapel, Windsor; and there the banners of the several knights are suspended. The costume now consists chiefly of a mantle of dark blue velvet, hood of crimson velvet, cap with an ostrich and heron plume, stockings of white silk, and garter on the left knee, of dark blue velvet, with the motto in gold letters. A gold medallion of St. George and the Dragon, suspended by a blue ribbon, is worn as a badge; hence the phrase that a man has received the blue ribbon are frequently used to express an appointment as knight of the garter. A star is also worn on the left breast. Ladies were members of the fraternity so late as the reign of Edward IV.

GARTH, SAMUEL, eminent as a physician and a wit, during the reigns of William III. and Anne, was descended of a good Yorkshire family, received his academical education at Peterhouse, Cambridge, and graduated as M.D. in 1691. Having settled in London, his skill and his conversational powers soon acquired him a very extensive practice. Being a zealous Whig, he became intimate with the wits and great men of the Whig party. At the accession of the House of Hanover, he obtained his reward in the honour of knighthood, and in the offices of physician and ordinary to George I., and physician-general to the army. He died January 18, 1718.

Garth is known in our literary history as the author of a mock-heroic poem called 'The Dispensary,' which he wrote in aid of a dispensary, which was then a new kind of charitable institution, and to satirise the Apothecaries' Company, who opposed it. Garth wrote other original poems, and superintended the translation of Ovid, in which were engaged Dryden, Addison, Gay, Pope, Congreve, Rowe, and others. The 14th, and a part of the 15th books, were translated by Garth.

GARVE, CHRISTIAN, was born at Breslau in the year 1742. On the death of Gellert in 1769, Garve was called to Leipzig to fill the vacant professorship, and he read lectures on pure mathematics and logic. At last he was obliged to resign his office on account of ill health, and to return to his native town, where he was a private teacher for nearly the remainder of his life. His translation of Burke 'On the Sublime and Beautiful,'

and of other English works, and his 'Philosophical Treatises' first made him known as an author. At the suggestion of Frederick the Great, he published an edition of Cicero's 'Offices,' which appeared in 1783. Garve died in 1798.

Garve is one of those writers who were called philosophers before German philosophy had assumed that peculiar character which it bears at present. His treatises are in a popular style, and are on practical subjects, such as 'Patience under Calamity,' 'the Advantages of a Moral Life,' and so on. Though Garve does not discuss abstruse matters, nor leave the sphere of practical usefulness, he often considers his subjects in a new light. Garve translated the 'Politik,' 'Ethics' and 'Rhetoric' of Aristotle into German.

GAS, a term employed by chemists as synonymous with air. The main difference between vapours and gases is, that vapours are reduced to solids or liquids when the heat is withdrawn; while gases preserve their aëriform state at common temperatures. This difference is one of degree only, but it is usefully retained.

Every gas consists of the ponderable matter from which its name is derived, combined with that degree of specific heat which is necessary to its aëriform existence.

The number of gaseous bodies is great, and they possess in many respects such different properties that it would be impossible to give a general description of them. The qualities therefore peculiar to each gas are stated under its proper head.

Chemists differ in opinion as to whether all gases, under the same volume and pressure, have the same specific heat; but there seems no question that all gases are subject to the same increase of volume when subjected to the same increase of temperature.

Gay-Lussac found that, when 100 volumes of gas or air are heated from 32° to 212° F., they become 137½ volumes; or the increase is $\frac{1}{480}$ for each degree of Fahrenheit. This law has supplied a simple rule for determining what the known bulk of a gas at any temperature will be at any other temperature. Suppose, for example, it is desired to know what the bulk of 100 cubic inches of air at 32° will be at 60°: subtract 32 from 480, the remainder is 448; to which add the degrees above zero indicating the temperature of the air; these are 32° and 60°, making 480 and 508. Then say 480 : 508 :: 100 : 105.832 the volume of the air at 60°.

Air suffers diminution of volume in proportion to the pressure to which it is subjected, and the same law holds good with all the more incondensible gases.

The solubility of gases in water is extremely various. Dr. Henry ascertained that the volume of each gas absorbed by water is the same, whatever be the pressure to which the gas is previously subjected. 100 volumes of water will absorb 450 volumes of cyanogen; whereas the absorption of hydrogen is only 2 volumes. In general, the more easily a gas is condensable by cold and pressure, the more soluble it is in water. Gases are also absorbed by charcoal and other porous bodies, the absorption being in ammonia 90 times the volume of the absorbent, and in hydrogen 1.75 times. Priestley found that different kinds of air which have no affinity do not, when mixed together, separate spontaneously, but continue diffused through each other. Dalton hence inferred that the particles of one gas, though repulsive to each other, do not repel those of a different kind; and that one gas acts as a vacuum with respect to another. If therefore a vessel full of carbonic acid be made to communicate with another of hydrogen, the particles of each gas insinuate themselves between the particles of each other till they are equally diffused through both vessels.

To Dr. Priestley also we are indebted for the important discovery that gases can pass through membranes which are perfectly air-tight, and by this action he explained that of the atmosphere upon the blood in the lungs. Dr. Mitchell has since found, that while 1 minute is sufficient to allow a given quantity of ammonia to penetrate through a particular kind of membrane, 160 minutes are required for an equal volume of carbonic oxide.

Dr. Faraday has liquefied some gases and solidified others. The method which he employed consisted in combining the condensing powers of mechanical compression with that of very considerable depression of temperature. The first object was attained by the successive action of two air-pumps. The tubes into which the air, thus condensed, was made to pass were of green bottle-glass, and had a curvature at one portion of their length adapted to immersion in a cooling mixture: they were provided with suitable stopcocks, screws, connecting pieces, and terminal caps, sufficiently air-tight to sustain a pressure of 50 atmospheres. Cold was applied to the curved portions of the tube by their immersion in a bath of Thilorier's mixture of solid carbonic acid and ether. The degree of cold thus produced, when the mixture was surrounded by the air, was −106° Fahr., by an alcohol thermometer; but when placed in vacuo, the thermometer indicated 166° below zero. Without the aid of mechanical pressure, Faraday liquefied sulphurous acid gas, cyanogen, chlorine, ammoniacal gas, hydro-sulphuric acid gas, carbonic acid, hydrochloric acid, and nitrous oxide. With the combined aid of cold and pressure he liquefied sulphuretted hydrogen, arseniuretted hydrogen, hydriodic acid, hydrobromic acid, nitric oxide, fluosilicon, and olefiant gas. Hydriodic acid and hydrobromic acid could be obtained either in a solid or liquid state. Muriatic acid gas did not freeze at the lowest temperature to which it could be subjected. Sulphurous acid froze into transparent and colourless crystals. Sulphuretted hydrogen solidified in masses of confused crystals of a white colour, at a temperature of −122° Fahr. Euchlorine was easily converted from the gaseous state into a solid crystalline body. Nitrous oxide was obtained solid at the temperature of the carbonic acid bath *in vacuo*. Ammonia was obtained in the state of solid white crystals, and retained this form at a temperature of −103°. Alcohol, ether, and chlorine have not yet been solidified; oxygen, hydrogen, nitrogen, and carbonic oxide have neither been solidified nor liquefied.

GAS-LIGHTING. When coal, oil, wax, wood, or any other organic inflammable substance is exposed to destructive distillation in closed vessels, an inflammable gas is the result. This gas is some compound of hydrogen and carbon: more or less brilliant when ignited, according to its constitution. That the gas obtainable from coal is inflammable has been known for more than 200 years; and so long ago as 1691 Dr. Clayton made and used inflammable gas as a philosophical experiment. In 1733 Sir James Lowther brought before the notice of the Royal Society the existence of inflammable gas in one of the Whitehaven collieries; and some years afterwards Dr. Watson further drew public attention to the subject.

But, although the properties of coal gas were known to so many persons, no one thought of applying it to a useful object until the year 1792, when Mr. Murdoch, an engineer, residing at Redruth in Cornwall, erected a little gasometer and apparatus, which produced gas enough to light his own house and offices. In 1797 he erected a similar apparatus in Ayrshire, where he then resided. In the following year he was engaged to put up a gas-work at the manufactory of Boulton and Watt, at Soho. This was the first application of gas in the large way; but, excepting in manufactories or among scientific men, it excited little attention until the year 1802, when the front of the great Soho manufactory was brilliantly illuminated with it on the occasion of the public rejoicings at the peace. Soon after this, several manufacturers, whose works required light and heat, adopted the use of gas. Mr. Winsor, a German, brought the subject forward in London, and formed a 'National Light and Heat Company,' in 1804, which failed. In 1807 however he lighted up Pall Mall, and this continued for some years to be the only street in London in which gas was used. In a few years afterwards a Gas Company was chartered; and London gradually became better lighted. The business of the company steadily increased; and in the year 1823 it was shown that this company alone consumed annually 20,678 chaldrons of coals, which produced on an average 680,000 cubic feet of gas every night; this was distributed by means of 122 miles of pipe, which supplied more than 30,000 burners, giving a light equal to as many pounds of tallow candles. Several other companies were established in London. The provincial towns followed the example, and continental cities one by one availed themselves of this useful system, until at length it has become one of the best known and extensively used of modern improvements.

Various substitutes for coal in gas-making have been proposed from time to time, such as resin, wood, and peat, but with little success. Oil yields a brilliant gas, which is easily manufactured; but coal excels them all in cheapness, and is almost universally employed.

Although in the large way there are many practical difficulties to be surmounted in the manufacture of coal gas, the operation is easily understood; it is merely a process of distillation. A quantity of coal is put into a retort, which is well closed, and placed upon the fire; the temperature is raised to redness, which decomposes the coal, and drives the gas resulting from the decomposition through a pipe leading from the retort to the receptable prepared for it. A mass of coke remains, of greater bulk, though less weight, than the coal first put in. Such is the theory of gas-making; the manner of putting it into practice remains to be described. The retorts now in use are generally long cast-iron vessels, semi-cylindrical in shape, with the flat side placed lowermost, and each holding from two to three bushels of coals. They are placed in ovens, in groups of three, five, seven, or more; and their mouths, where the coal is put in, stand out in front of the ovens. Just behind the mouth of the retort a pipe leads from it perpendicularly upwards of several feet; then, taking a sudden turn, it descends again, and enters a much larger pipe technically called the hydraulic main, which runs through the whole building, and receives the gas produced from all the retorts. This great main is generally about half full of the tar and water which leave the coal with the heated gas, and rise with it in the state of vapour, but are condensed by the coldness of the main. Into this mixture the end of the pipe dips, and is thus closed against a return of gas, which would take place if the supply should slacken.

The gas is now made; but it is very impure, being mixed with water, tar, sulphuretted hydrogen gas, and other impurities. The tar and water are easily got rid of, little more being required for this purpose than to cool the gas and to allow the deposit to run off. The separation of the sulphuretted hydrogen gas can only be effected by some substance for which it has a chemical attraction, but which has no influence on coal gas. Such a substance is lime. The lime is used by being mixed up with water into a thin pasty mass, which is placed in a cylindrical vessel, and is constantly stirred by machinery. The gas as it comes from the condenser passes into the lime, and comes from it partially purified; it then enters another purifier, made and furnished precisely in a similar way; after that another; and often a fourth, in large works. When it leaves the last vessel, it may be considered pure.

In the manufacture of oil gas it is only necessary to project a small stream of oil into a red-hot retort, in which pieces of brick or coke are inclosed; the gas immediately passes off through another pipe, and may be at once received into the gasometer.

The gasometer employed in gas-works is a very large cylindrical vessel, closed at the top and open at bottom; it is suspended by a rope or chain, and weight, in a tank filled with water, in which it rises and falls freely, being kept in its place by guide-wheels. Two tubes pass under and through the water, reaching above its surface into the hollow of the gasometer; one of them comes from the purifiers to admit the gas into the gasometer, the other carries it off when wanted for use. The action of this part of the apparatus is simple; when the gasometer is near the top of the water, it is full of gas, which has no communication with the air, because the edge of the gasometer is under water. If now it be pressed downwards, which is effected by lessening the counterbalancing weight,

the gas will be forced through the pipe which is to convey the gas out, and which must be left open for the purpose. When the gasometer reaches the bottom, it will be full of water, and ready to receive gas again, which is admitted through the other tube; the gasometer then rises to the top as the gas goes in, and may be pressed down again. In this way it is alternately filled and emptied. In most establishments there are many gasometers, some filling, and others emptying. Some gasometers are now made so large as to have a capacity of 100,000 cubic feet. Some of them have the telescope construction; that is, there are two gas-holders, one within another, and both within the tank; the inner gas-holder is filled first, and then, by an ingenious contrivance, it elevates the outer one as the gas continues to enter.

Many other contrivances are used before the gas is carried to its destination: a meter, to measure it; a governor, to equalise the flow; a pressure-gauge, to indicate the resistance offered to its passage; and a tell-tale, to show the quantity manufactured during every hour.

The tubes which convey the gas are of course larger or smaller, according to the number of burners which they supply. The largest in use are about eighteen inches in diameter, the smallest about a quarter of an inch. The street gas-pipes are laid in slightly inclined planes, and a vessel is placed at the bottom of each descent to receive and carry off any deposition which would otherwise clog the pipes.

The burners are of many different forms, and each has its technical name; such as the argand, the fan, the cock-spur, and the bat's wing. The arrangement and mangement of the burners in practical use are exceedingly varied.

It is estimated that there are 6,000,000 tons of coal now (1848) consumed in England for gas-making; that one-twelfth, of this, or 500,000 tons are used in London alone; that the production in London is 500,000 cwts. of coke, and 4,500,000 cubic feet of gas; and that the length of the gas-mains in London is upwards of 1500 miles.

GASCOIGNE, GEORGE, was the son of Sir John Gascoigne, the head of an ancient family in Essex. He was born about or before 1537. He was educated at Cambridge, and afterwards entered at Gray's Inn as a student of law. Disinherited, as far as he could be by his father for prodigality, and unable to obtain employment, he became a soldier of fortune under William, Prince of Orange, whose favour he gained. After two years of hard service, he was one of five hundred Englishmen who, being left to garrison the indefensible fort of Falkenburg, fought their way to the walls of Leyden during its siege, but, being refused admittance, were compelled to surrender to the Spaniards. Four months later they were sent home to England. Gascoigne then partially resumed the study of the law, married (it is said) a Scottish lady whom he met in France, and usually resided at Walthamstow in his native county, where gardening and literary composition were his chief employments. In 1575 he recited verses before Queen Elizabeth at Kenilworth, and wrote an account of the pageantries. Sir Walter Scott's use of this incident is well known. He died at Stamford, on the 7th of October, 1577, commending his wife and child to the bounty of the queen. His collected works were published in 1587. His comedy of the 'Supposes,' which is a free translation from 'Gli Suppositi' of Ariosto, is the earliest prose play existing in the language.

GASCOYGNE, WILLIAM, an astronomer of the seventeenth century, who is distinguished by having been the first inventor of the micrometer (about 1641). The instrument appears to have originally consisted either of two parallel wires, or of two plates of metal, placed in the focus of the eye-glass of a telescope: the nearest edges of the plates, which were ground fine, were parallel to one another; and the plates or the wires were capable of being moved, so that the image of an object could be exactly comprehended between them: a scale served for the measurement of the angle subtended by the interval, and Gascoygne is said to have used this instrument for the purpose of measuring the diameters of the moon and planets, and also for determining the magnitudes or distances of terrestrial objects.

The few circumstances which are known concerning this ingenious person are given under HORROCKS, JEREMIAH.

GASCONY. [GUIENNE.]

GASSE, STEFANO and LUIGI, twin brothers, and both architects, were born at Naples, August 8th, 1778, but were of French origin. They were educated at Paris under the care of their maternal uncle the Abbate Minotti, and subsequently were sent by the Institute of France to complete their studies at Rome. In 1802 they settled at Naples, and practised together. That place owes to them many of its best modern edifices. Luigi died on the 11th of November, 1833; Stefano, February 21, 1840.

GASSENDI, PIERRE (properly Gassend), was born 22nd of January, 1592, at Chantersier, a village near Digne, in the department of the Lower Alps, of poor parents. At a very early period he evinced a taste for astronomy. A dispute having arisen one evening between some children of his own age whether the moon or clouds were moving, and his companions maintaining that the apparent motion was that of the moon, but that the clouds were stationary, Gassendi proceeded to undeceive them by ocular proof: placing his playfellows beneath a tree, he bade them notice that while the moon was steadily visible between the same branches, different clouds were constantly appearing in succession.

Gassendi was sent to school at Digne. Upon completing the usual course, he returned to Chantersier in order to prosecute his studies in retirement; but he had not been there long when he was invited, at the early age of 16, to teach rhetoric at Digne. This office he shortly relinquished, and proceeded to Aix to study divinity. In 1614 he was appointed professor of theology at Digne, and two years afterwards he was invited to Aix to fill the chairs of divinity and philosophy, vacant by the death of Fesac, his master and teacher.

The careful perusal of the works of Vives,

Ramus, and Patricius, had thoroughly convinced Gassendi of the faults and defects of the philosophy of the schoolmen. He wrote against them in a work entitled 'Exercitationes paradoxicæ adversus Aristoteleos.' The appearance of the first volume, which was published at Grenoble in 1624, gained for its author a well-established and wide-spread reputation. Nicholas Peiresc used his influence to obtain for Gassendi a canonry in the cathedral of Digne. As the result of his anatomical researches, he composed a treatise to prove that man was intended to live upon vegetables. In 1629 a second volume of his 'Exercitationes' appeared, the object of which was to expose the futility of the Aristotelian scholastic logic.

In 1628 Gassendi visited Holland with a view to gain and to cultivate an acquaintance with the philosophers of that country. During his residence there he composed, at the instance of his friend Mersenne, the work entitled 'Examen Philosophicum Rob^ti^ Fludd,' in answer to the dissertation of our countryman on the subject of the Mosaic philosophy. Upon his return to Digne, Gassendi applied himself with great diligence to astronomical studies, for which his fondness had grown with his years, and he had the good fortune, on the 7th of November, 1631, to be the first to observe a transit of the planet Mercury over the sun's disc, which had been previously calculated by Kepler.

In the year 1641, being called to Paris by a law-suit arising out of the affairs of the chapter, his amiable disposition and brilliant talents obtained for Gassendi the regard and esteem of the most distinguished persons of the metropolis of France, and the friendship of Cardinal Richelieu and of his brother, Cardinal du Plessis, archbishop of Lyon. At this period Des Cartes, with whom Gassendi had long maintained a close and friendly intercourse, was working a reform in philosophy, and by the publication of his 'Meditationes' had opened for it a new and more useful career. In this work however Gassendi discovered much that was objectionable, and forthwith attacked the philosophical system of his friend in a work entitled 'Disquisitio Metaphysica, seu Dubitationes ad Meditationes Cartesii,' which was put into the hands of Des Cartes by their mutual friend Mersenne. Des Cartes wrote an answer, which he published together with the 'Doubts,' under the head, 'Sixth Objection to the Meditations.' In 1643 Gassendi composed the 'Instantiæ' in reply, and circulated them in MS. in Paris before he sent them to M. Sorbière to be printed at Amsterdam. The latter circumstance tended to confirm and widen the difference which, in the course of the controversy, had grown up between the two friends, who however entertained a sincere respect for each other, and were eventually reconciled by the kindly offices of a common friend, the Abbé d'Estrées.

In 1645 Gassendi was appointed professor of mathematics in the College Royal of Paris, upon the nomination and by the influence of Cardinal du Plessis. As this institution was intended principally for the advancement of astronomy, he read lectures upon that science to a crowded and distinguished audience, by which he increased the reputation he had previously acquired.

But the intensity of his studies had undermined the constitution of Gassendi, and, a severe cold having occasioned inflammation of the lungs, he was forced to retire to Digne for the restoration of his health. In this retirement however he was far from idle. In 1647 he published his work 'De Vitâ et Moribus Epicuri.' The 'Syntagma Philosophiæ Epicureæ,' which followed in 1649, is an attempt to reconstruct the system of Epicurus out of the extant fragments.

His native air having produced a considerable amelioration in his strength, Gassendi was able to return to Paris in 1653, and the next year he published 'Tychonis Brahaei, Copernici, Peurbachii, &c. Vitæ,' a work which was not confined to the biography of these great men, but also contained a brief sketch of ancient and modern astronomy down to his own day. The resumption of his literary labours quickly brought on a return of his former disorder, and he died on the 14th of October, 1655, in the 63rd year of his age.

The philosophical reserve and moderation of Gassendi have led Bayle to designate him as a sceptic, which however, to judge at least from his writings, is little in accordance with the spirit of his philosophy. By the philosophical cast of his mind and the variety of his acquirements, as well as by the amiable moderation of his character, Gassendi was one of the brightest ornaments of his age. Bayle has justly styled him the greatest philosopher among scholars, and the greatest scholar among philosophers.

The works of Gassendi were collected by Montmort and Sorbière, 6 vols. fol., Lyon, 1658; and by Averrani, 6 vols. fol., Firenze, 1728. There is a life of Gassendi by Sorbière, prefixed to the collected works, and one by Bougerel, Paris, 1737.

GASTEROMYCE'TES, a sub-order or cohort of the natural order of *Fungi*. It is distinguished from the higher forms of fungi by the reproductive organs being included in a case of some kind or another.

The first tribe of the Gasteromycetes is *Angiogastres*. Of this tribe there are four sub-tribes or sections. The first, *Phalloidei*, has a distinct receptacle at length bursting through the excipulum. Of this section the genus *Phallus* is the type. There are several species of this genus known in Great Britain, where they are called Stinkhorns on account of their disgusting smell. *P. impudicus*, the common Stinkhorn, is found in woods and thickets in summer and autumn. *P. caninus* is a rarer species. It grows in woods and hedges in the south of England. From the colour of its pileus, by which it may be distinguished, it is called Red-Headed Stinkhorn.

The second section is *Tuberaceæ*. The third section, *Nidulariacei*, has a receptacle filled with free or elastically pediceliate sporangia. The type of this section is *Nidularia*, or Bird's-Nest Peziza. There are three species of this genus found in Great Britain. The most common is *N. campanulata*, which is found on the ground, decaying dung, sticks, &c. They are pretty little fungi, resembling birds' nests, not only in their shape, but also in their sporangia, which lie at the bottom of the receptacle like little eggs.

The fourth section, *Carpoboli*, have a solitary sporangium protruding from the receptacle. The genera belonging to it are *Carpobolus*, *Sphærobolus*, *Thelebolus*, *Pilobolus*, *Atractobolus*. A species of the last-named, *A. ubiquitarius*, is found on wood, stones, and other things, after rain, appearing like scattered meal. The Rev. M. J. Berkeley says, however, that he is convinced that it is of insect origin. *Sphærobolus stellatus* is found on rotten wood and sticks, in the autumn. In its early state it is covered by a fine woolly or cottony web, which is very fugacious. When the young plants have pushed through this web, they have the appearance of mustard-seeds. Each plant consists of an outer and an inner membrane.

The tribe *Pyrenomycetes* is frequently regarded as a sub-order or cohort. It consists of genera having more or less the character of *Sphæria*. Most of the species are found on the decaying leaves of other plants, and vary with the species of the plant on which they grow. The genera in which the greatest number of species have been described by British botanists are *Cytispora*, *Phoma*, *Dothidea*, *Asteroma*, *Rhytisma*, *Phacidium*, *Hysterium*, and *Leptostroma*.

The third tribe is *Trichospermi*; the fourth, *Trichodermacei*.

The fifth tribe, *Perisporiacei*, has a peridium scarcely distinct from the nucleus, and the sporidia immersed in pulp, free or included in peridiola. The genera in this tribe are not numerous.

The most extensive genus is *Erysiphe*, the species of which produce various forms of mildew. *E. pannosa*, the Rose Mildew, is found on the leaves of the various species of rose. It is easily known by its shining clothy aspect, which is very different from the rest of the genus. *E. communis* is an extremely common fungus, and is found on various kind of herbaceous plants. The same may be said of the forms of *Uredo*, *Æcidium*, and *Puccinia*.

The sub-order *Hyphomycetes* of Berkeley and others includes many of the genera that are referred by Fries to the fourth order, *Coniomycetes*. The first tribe, *Cephalotrichei*, includes the genera *Isaria*, *Anthina*, and *Ceratium*. The species of the two first are not numerous or common. *Ceratium hydnoides* is not uncommon on rotten wood.

The tribes *Mucori*, *Dematiei*, and *Mucedines* consist of various genera of plants forming moulds, mildews, blights, brands, &c.

The tribe *Sepidoniei* includes the genera *Sepidonium*, *Epochnum*, *Psilonia*, and *Fusisporium*. The species of *Fusisporium* are found in decaying fruits and vegetables. Von Martius has described one under the name of *F. Solani*, which attacks the tubers of the potato, and produces a kind of rot.

The last sub-order, *Coniomycetes*, embraces those fungi whose sporidia are produced beneath the epidermis of plants, and which in many instances appear to be rather diseases of the tissue than independent existences. The first sub-section or tribe is *Tuberculariní*. The second tribe, *Stilbosporei*, consists of sporidia glued together into a nucleus, without any covering, under the cuticle of plants, at length bursting forth together with the gelatine. The genera of this tribe are *Nemaspora*, *Septoria*, *Stilbospora*, *Didymasporium* and *Melancorium*.

The third tribe, *Sporidesmiei*, have their sporidi chained together into flocci. The genera ar *Aregma*, *Torula*, and *Spilocæa*.

The fourth tribe, *Hypodermii*, includes thos species of fungi which are found underneath th cuticle of living plants. The principal genera ar *Puccinia*, *Æcidium*, and *Uredo*.

GASTERO'PODA, the third class of Mollusks according to the system of Cuvier, who remark that it is very numerous, and that an idea may b formed of it from the slugs and shell-snails. Before we proceed to the sections, or rather orders, into which Cuvier has subdivided this extensive congregation, it will be necessary to put the reader in possession of his views of the conformation necessary to bring a molluscous animal within the class of Gastropods.

These mollusks, then, according to the great French zoologist, generally creep upon a fleshy disk placed under the belly, but which sometimes takes the form of a furrow or that of a vertical plate. The back is furnished with a mantle, which is more or less extensive, presents diversities of form, and, in the greatest number of genera, produces a shell. The head, placed in front, shows itself more or less, according to its greater or less retirement under the mantle, and is furnished with small tentacles, which are above the mouth, and never surround it. Their number ranges from two to six, and they are sometimes altogether wanting. Their proper use is only for touching, and, at the most, for smelling. The eyes are very small, sometimes adhering to the head; sometimes at the base, or at the side, or at the point of the tentacle; and sometimes these organs are altogether wanting. The position, the structure, and the nature of the respiratory organs vary, and afford grounds for dividing the animals into many families; but they never have any other than a single aortic heart, that is to say, placed between the pulmonary vein and the aorta. The site of the apertures by which the organs of generation come out and that of the vent vary; but they are nearly always on the right side of the body.

Many of the Gastropods are absolutely naked; others have only a concealed shell; but the greater number carry a shell, which is capable of receiving and sheltering them.

These shells are produced in the thickness of the mantle; some of them are symmetrical, consisting of more pieces than one; others are symmetrical, but formed of a single piece; and there are also some non-symmetrical, which in species where they are very concave, and where they grow a long time, necessarily produce an oblique spire. If the reader will imagine an oblique cone in which other cones are successively placed, always larger in a certain direction than in the others, it will follow that the whole rolls itself upon the side which is least. The part on which the cone is rolled is called the *Columella*, or *Pillar*: this is sometimes solid, and sometimes hollow. When it is hollow, the open end of it is named the *Umbilicus*. The whorls of the shell may remain nearly

on the same plane, or may extend towards the base of the columella. In the last case, the preceding whorls are raised one above the other, and form what is called the *Spire*, which is pointed in proportion to the more rapid descent and small enlargement of the whorls. Those shells with an elongated or projecting spire are termed *Turbinated Shells*. When, on the contrary, the whorls remain nearly on the same plane, and are not enveloped one within another, the spire is flat or even concave. These are called *Discoïd Shells*. When the upper part of each whorl envelops the preceding ones, the spire is said to be concealed. That part of the shell from which the animal comes forth is termed the *Aperture*. When the whorls remain nearly on the same plane, the animal, when it creeps, carries its shell disposed vertically, the columella lying across the posterior part of the back; and its head passes under the border of the aperture opposed to the columella. When the spire is elongated, it is directed obliquely to the right in almost all the species: a small number only have it directed to the left when they creep; these shells are called *Reversed* or *Left-Handed Shells*. The heart is always on the side opposite to that where the spire is directed. It is therefore ordinarily on the left side; in the reversed or left-handed shells it is on the right. The contrary of this disposition holds good with regard to the organs of generation.

The organs of respiration, which are always situated in the last whorl of the shell, receive the ambient element under its edge, sometimes by means of the mantle being entirely detached from the body along the whole length of this edge, sometimes in consequence of its being merely pierced by a hole. The border of the mantle is sometimes prolonged into a canal, so that the animal can advance to seek the surrounding fluid without exposing either its head or foot beyond the shell. For this purpose the shell, in such cases, has also on its head, near to that end of the columella (the base) which is opposed to that whereto the spire tends (the apex), a notch or a canal for the lodgement of that of the mantle. The canal is consequently on the left in the ordinary species, and on the right in the reversed shells. The animal, being very flexible, is able to vary the direction of its shell, and most frequently, when there is a notch or a canal, it is directed forwards; the spire is thus behind, the columella on the left, and the opposite border, or external lip, as it is termed by some conchologists, on the right. A directly contrary disposition is manifested in the reversed shells, and these, in consequence of this contrary disposition, turn towards the left instead of turning towards the right, as in the normal structure. It follows as a consequence that the aperture of the shell, which is formed principally by the last whorl, is more or less large in proportion to the other whorls, accordingly as the head or foot of the animal, which is to be constantly protruded therefrom and retracted thereunto, is more or less voluminous compared with the mass of the viscera which remain fixed within the shell. The aperture is moreover wider or narrower in proportion as the same parts are more or less thick.

There are shells whose aperture is narrow and long; the foot, in such cases, is delicate, and doubles together for the purpose of re-admission. The greater number of aquatic Gastropods with a spiral shell have an *Operculum*, or separate piece, which is sometimes horny, sometimes calcareous, attached on the posterior part of the foot, and which shuts the shell when the animal has re-entered it, and is entirely retracted within.

Cuvier, in continuation, remarks that there are Gastropods with the sexes separate, and others which are hermaphrodites: of these last some have the power of reproduction without the aid of a second individual, while the others require a reciprocal copulation for the continuation of the species. He adds that the organs of digestion present as many differences as those of respiration, and he divides the class into the following orders.

1. *Les Pulmonés* or *Pulmonifera* (*Pulmobranchiata*, De Blainville). These all respire atmospheric air in a cavity, the narrow orifice of which they have the power of opening and closing at will. All are hermaphrodites. Some are destitute of a shell; others have a shell, and that often completely turbinated, but always without an operculum.

Examples.—*Slug, Snail, Limnæa*, &c. (terrestrial and aquatic).

2. *Les Nudibranches* or *Nudibranchiata* (*Polybranchiata*, De Blainville). Destitute of a shell, with the branchiæ of diverse forms, exposed on some part of the back. Hermaphrodite, marine.

Examples.—*Doris, Glaucus*, &c.

3. *Les Inferobranches* or *Inferobranchiata*. In most respects like the preceding, but the branchiæ are arranged under the projecting border of the mantle.

Examples.—*Phyllidia, Diphyllidia*, &c.

4. *Les Tectibranches* or *Tectibranchiata* (*Monopleurobranchiata*, De Blainville). Branchiæ on the back or on the side, covered by an extension of the mantle (which almost always contains a shell more or less developed), or sometimes only enveloped in a reflex border of the foot. Hermaphrodite, marine.

Examples.—*Pleurobranchus, Aplysia, Bolabella*, &c.

The above four orders are united by M. De Blainville under the head of *Paracephalophora Monoica*.

5. *Les Heteropodes* or *Heteropodæ* (*Nectopoda*, De Blainville). Branchiæ on the back, where they form a range of little tufts or plumelets, protected in some by a symmetrical shell, which also covers some of the viscera. Their main characteristic is this: the foot, instead of forming a horizontal disc, is compressed in a muscular vertical plate, which serves as a fin, at the edge of which in many species is a sort of sucker in place of any vestige of the horizontal foot of the rest of the class.

Examples.—*Carinaria, Atlanta, Firola*, &c.

6. *Les Pectinibranches*, or *Pectinibranchiata* (*Paracephalophora Dioica*, De Blainville). Sexes separate. The respiratory organs consist almost always of branchiæ composed of leaflets ranged in comb-like order, and concealed in a dorsal cavity opening between the border of the mantle and the

R.B.A.N.M.S.H. & M. LIBRARY
Accession No. 4123
U.D.C. No. 723
Date; 4-2-81

body. In almost all cases the shell is turbinated, with the mouth sometimes entire, sometimes notched, sometimes furnished with a siphon, and generally capable of being closed by an operculum, attached to the posterior part of the foot of the mollusk.

Examples.—*Trochus, Paludina Nerita, Conus, Cypræa Buccinum*, &c. (Tongue generally rasp or file-like.)

7. *Les Tubulibranchiates* or *Tubulibranchiata*. Detached from the preceding, to which they are closely allied, in consequence of the shell being in the form of a tube more or less irregular, commencing spirally, and attached to extraneous bodies. Hermaphrodites.

Examples.—*Vermetus, Magilus*, &c.

8. *Les Scutibranches* or *Scutibranchiata* (*Paracephalophora Hermaphroditica* with the exception of the Chitons, De Blainville). Branchiæ analogous to those of the *Pectinibranchiata*; but the species are hermaphrodites in such a way as to produce self-fecundation. The shells are very open, generally in the form of a buckler without any turbination. No operculum.

Examples.—*Hyalotis, Fissurella*, &c.

9. *Les Cyclobranches* or *Cyclobranchiata* (*Cervicobranchiata*, De Blainville). Reproduction as in the preceding. Shell composed of one or many pieces; never turbinated; no operculum; the branchiæ arranged under the margins of the mantle as in the *Inferobranchiata*.

Examples.—*Patella, Chiton.*

Fossil Gasteropoda.

A class which comprehends so great a number of animated organised beings, having the most extensive geographical range—a class embracing an immense mass of mollusks, multitudes of which are littoral, many terrestrial and inhabitants of the fresh waters, and a considerable number pelagic, for the most part protected by hard calcareous shells, presents materials, in a fossil state, of the greatest consequence to the geologist for deciphering the mineral structure of the earth.

Mr. Dillwyn, as is noticed by Dr. Buckland in his 'Bridgewater Treatise,' asserts that every fossil turbinated univalve of the older beds, from the transition lime to the lias, belongs to the herbivorous genera; and that the herbivorous class extends through every stratum in the entire series of geological formations, and still retains its place among the inhabitants of our existing seas. On the other hand, the shells of marine carnivorous univalves are very abundant in the tertiary strata above the chalk, but are rare in the secondary strata from the chalk downwards to the inferior oolite; beneath which no trace of them has yet been found. Dr. Buckland further seems to be of opinion that, in the economy of sub-marine life, the great family of carnivorous trachelipods performed the same necessary office during the tertiary period which is alloted to them in the present ocean, and he alludes to the evidence showing that, in times anterior to and during the deposition of the chalk, the same important functions were consigned to other carnivorous mollusks (the testaceous cephalopods), which are of comparatively rare occurrence in the tertiary strata in our modern seas; but throughout the secondary and transition formations, where carnivorous trachelipods are either wholly wanting or extremely scarce, there occur abundant remains of carnivorous cephalopods, consisting of the chambered shells of nautili and ammonites, and many kindred extinct genera of polythalamous shells. Their sudden and nearly total disappearance, as Dr. Buckland remarks, would have allowed the herbivorous tribes to increase to an excess that would ultimately have been destructive of marine vegetation, as well as of themselves, had they not been replaced by a different order of carnivorous creatures destined to perform in another manner the office executed by the various extinct genera of testaceous cephalopods. 'From that time onwards,' continues Dr. Buckland, 'we have evidence of the abundance of carnivorous trachelipods, and we see good reason to adopt the conclusion of Mr. Dillwyn, that in the formations above the chalk the vast and sudden decrease of one predaceous tribe has been provided for by the creation of many new genera and species, possessed of similar appetencies, and yet formed for obtaining their prey by habits entirely different from those of the cephalopods.'

GASTRIC JUICE. This term is applied to the fluid, secreted from the interior of the stomach, which is the principal agent in digestion. The gastric juice is a transparent slightly viscid liquid, which, when obtained from the stomach of an animal while fasting, possesses neither acid nor alkaline reaction, but has a saline taste. During the process of digestion, on the contrary, it is distinctly acid. Gastric juice possesses strong antiseptic properties, suspending putrefaction, and restoring the freshness of tainted meat: it also coagulates milk, which property is independent of the presence of any acid. But the most remarkable quality of the secretion of the stomach is its solvent effect, which will even act on nutritive substances out of the body. The chemical composition in the horse is as follows:—

Water	984.00	
Solid residue	16.00	
		——1000.
Organic matter	10.52	
Soluble salts	5.02	
Insoluble salts	0.46	
		——16.

From this analysis, and other similar researches, it appears that the acid gastric juice consists of an organic substance called pepsin; another substance resembling extract of flesh; a matter resembling saliva, free acids, especially muriatic acid, mucus, a little albumen, and various salts. [DIGESTION.]

GASTROCHÆ'NA, a genus of acephalous Mollusks or Conchifers, established by Spengler. Lamarck places it between *Pholas* and *Solen*, and Cuvier between *Fistulana* and *Teredina*. M. Deshayes, in his edition of the 'Animaux sans Vertèbres,' says that it is evident that Lamarck came to very erroneous conclusions as to this genus. The animal, observes M. Deshayes, has two posterior very short siphons when it is contracted; the lobes of the mantle are united up to

the gape of the valves, and even a little higher; this gaping of the valves, as well as the divarication of the lobes of the mantle, gives passage to a great short cylindrical foot, like that of the *Pholades*; but this opening is not at all destined for the passage of the siphons, as Lamarck supposed.

Mr. G. B. Sowerby ('Genera of Recent and Fossil Shells') remarks, that the genera *Pholas*, *Mya*, *Mytilus*, and *Chama*, have by turns served as a receptacle of the shells of this genus. He observes, that Lamarck has adopted Spengler's name, but has placed it next to *Pholas*, apparently not having known that the animal forms its own testaceous tube, either as a lining to the hollow it has previously perforated, or as a covering for its shell in those instances in which it has not perforated at all, but in which it has taken up its abode, as it frequently does, within some spiral univalve. Mr. Sowerby is further of opinion, that the fact of the shell being inclosed in a testaceous tube of its own depositing renders it proper to remove it into Lamarck's family of *Tubicolæ*, to which indeed it appears to Mr. Sowerby to be more nearly related, though he notices a very considerable analogy between the shelly tube of Lamarck's *Tubicolæ*, and the coriaceous epidermis, which not only in a great measure covers the shell, but also incloses the tubes of the animal of Lamarck's *Pholadaceæ*, and Mr. Sowerby consequently thinks that the two families might very properly be united.

Mr. Owen, in his paper on *Clavagella*, remarks how closely that form follows the modifications which have been observed in *Gastrochæna*.

Cuvier say that it appears that the *Gastrochænæ* constantly have a calcareous tube, and quotes Dr. Turton, M. Deshayes, and M. Audouin as having observed it.

M. Rang says that all the *Gastrochænæ* have not a calcareous tube, though all of them burrow in stones after the manner of *Pholades*. If this is to be taken literally, it does not exactly accord with the fact; for sometimes the animal does not burrow at all, at others (and very frequently) it burrows in madrepores. M. Rang adds, that two of the species which belonged to the genus *Fistulana* of Lamarck are now arranged in this, and that this arrangement is due to M. De Blainville. These two species, he says, are *Fistulana clava* and *F. ampullaria*. Of these, *Fistulala clava* is referred, among the synonymes, to *Gastrochæna*, Lamarck, and *Fistulana ampullaria* is declared by M. Deshayes to be a true *Fistulana*, but remarkable in this, that according to circumstances it forms a free tube sunk in the sand, or perforates calcareous bodies, and its tube serves as a lining to the cavity which it inhabits; this species therefore, he observes, would belong to the *Fistulanæ* in the first case, and to the genus *Gastrochæna* in the second, if indeed that genus be preserved.

M. Rang states that M. Charles Des Moulins, long time ago, and before the observations made upon this subject had discovered the existence of a tube in the *Gastrochænæ*, had shown that this tube, not only in the living species on the French coast, but in the fossil which was found at Merignac.

Fossil Gastrochænæ.

Among the fossil *Gastrochænæ*, *Gastrochæna tortuosa* has been found in the inferior oolite (Phillips); and Dr. Fitton, in his 'Stratigraphical Table,' records *Gastrochæna* (species doubtful) in the lower green-sand, in the Portland stone, in the Portland sand, in the Oxford oolite, in perforations in dicotyledonous (silicified) wood, and in the gault, east of Folkstone.

GATAKER, THOMAS, born in London in 1574, studied at Cambridge, and was afterwards preacher to the Society of Lincoln's Inn. He applied himself especially to the study of the Scriptures in the Hebrew and Greek texts, and wrote several works in illustration of the Old Testament. In 1642 he was chosen to sit in the Assembly of Divines at Westminster. He afterwards wrote with others the 'Annotations on the Bible,' which were published by the same Assembly; the Notes on Isaiah and Jeremiah are by him. In 1648 Gataker, with other London clergymen, remonstrated against the measures taken by the Long Parliament with respect to King Charles. In 1652 he published an edition of M. Aurelius's 'Meditations,' with a Latin translation, valuable notes, tables of reference, and a preliminary discourse on the philosophy of the Stoics. He died above 80 years of age. His son Charles published his 'Opera Critica,' 2 vols. fol., Utrecht, 1698.

GATES, HORATIO, was born in England in 1728. He received his military training in the English army, served in the West Indies, and accompanied General Braddock in his disastrous expedition against the French settlements on the Ohio in 1755. [BRADDOCK.] Being wounded in that affair, and obliged for a time to retire from active service, he purchased an estate in Virginia. He took the popular side in the revolutionary troubles, and was appointed adjutant-general on the breaking out of the war. In 1776 he was sent to command the army on Lake Champlain. His conduct at first was not approved of, insomuch that he was superseded in the spring of 1777; but in the following August he was appointed to oppose General Burgoyne, who had forced his way from the Canadian frontier to the Hudson. An indecisive battle was fought September 18th, but in a second, October 8th, the British were defeated. General Gates then blockaded his adversary at Saratoga, who found it necessary to capitulate with his whole army. [BURGOYNE.]

Gates became the popular hero of the day: and attempts were made, happily in vain, to raise him over the head of Washington. In June 1780, he was appointed to command the southern army, which at that time was in a wretched state of disorganisation, and in consequence he received, though superior in numbers, a total defeat, August 16th, at Camden, in South Carolina. [CORNWALLIS.] By great exertion he was again in condition to take the field, when he was superseded by General Greene, and his conduct was submitted to a court of inquiry: in the end he was honourably acquitted.

General Gates then retired to his Virginia estate, from which, in 1800, he removed New

York. In 1800 he was elected a member of the state legislature. Before his departure from Virginia he performed the noblest act of his life—the emancipation of his slaves, which he accompanied with a provision for those who needed assistance. He died April 10, 1806.

GATESHEAD. [DURHAM.]

GÂTINE, a district of Poitou, of which Parthenay was the capital, is now comprehended in the department of Deux Sèvres. [SÈVRES, DEUX.]

GÂTINAIS, LE, a district in France, partly comprehended in the province Ile-de-France, partly in that of Orleanais, and distinguished as Gâtinais Français and Gâtinais Orleanais, of which Melun and Montargis were the respective capitals. It is now included in the departments of SEINE-ET-MARNE and LOIRET.

GATSHINA. [PETERSBURG, ST., Government of.]

GATTERER, JOHANN CHRISTOPH, born in 1727, near Nürnberg, became professor of history at Göttingen, where he published numerous useful works on ancient history, geography, chronology, genealogy, heraldry, and diplomacy, on all which subjects his information was very extensive. Gatterer died at Göttingen in 1779.

There was another contemporary professor, Christoph Wilhelm Jacob Gatterer, at Heidelberg, who wrote works on geology and mineralogy.

GATTI, BERNARDINO called il Soiaro, from his habitual disposition to banter (*soiare*), was born, it is believed, at Cremona about 1495. He is one of the most distinguished of Correggio's pupils and imitators: there are several admirable works by him in Parma, Piacenza, and Cremona. He died in 1575.

GAUBIL, ANTHONY, a learned Jesuit, whose labours greatly advanced our knowledge of the literature of eastern Asia, was born in Languedoc in 1689. He entered the society of the Jesuits in 1704, and was sent in 1723 to China, where he applied himself to the study of the Chinese and Mantchoo languages. Gaubil also applied himself with great success to mathematics, and particularly to astronomy, without neglecting his ecclesiastical calling. Gaubil wrote several important works in China, the first of which is an 'Historical and Critical Treatise on the Chinese Astronomy,' published in the 'Observations Mathematiques, Astronomiques, Geographiques,' &c. But the work which reflects the greatest credit on Gaubil is his translation into French of the 'Choo-king,' which contains the earliest traditions respecting the history of China. It was published after his death by Desguignes, in 1771, at Paris. Gaubil published also a 'History of Genghis Khan and his Dynasty' (1739, Paris), which alone, according to the celebrated Chinese scholar Abel Remusat, would be sufficient to establish the reputation of the author. Gaubil died at Peking in 1759, aged 71, after having resided in China 36 years. For further particulars the reader may consult the 31st vol. of the 'Lettres curieuses et édifiantes.'

GAUDEN, JOHN, was born in 1605 at Mayland in Essex, his father being vicar of that parish. He was educated at Bury St. Edmund's, and St. John's College, Cambridge. In 1630 he became tutor in Wadham College, Oxford, and took [illegible] degree of doctor in divinity from that university. In 1640 he became chaplain to the Earl of Warwick, received two preferments from him, and first took the earl's or the popular side in politics. In 1640 he received a public present of a silver tankard from the House of Commons for a sermon preached before it, and in 1641 the lucrative deanery of Bocking, in Essex, from the same quarter. But it was noticed that he gradually approached to the Royalist church party. [illegible] perhaps, his exclusion from the Westminster Assembly of Divines, after his nomination as a member. On the Restoration Dr. Gauden was appointed chaplain to Charles II., and was elected bishop of Exeter; whence in 1004 he was translated to the see of Worcester; and on the 20th of September in that same year he died. In letters to Lord Clarendon and the Earl of Bristol, he alleged that he was the sole author of the famous work called 'Eikon Basilike,' which, purporting to contain meditations and prayers composed by King Charles I. in his captivity, had been published in 1648, a few days after his decapitation, and had excited a very lively sympathy towards the supposed author. This curious question has been discussed again and again by our historical writers. An elaborate history of the controversy is given by Dr. Wordsworth in his two works upon it: 'Who wrote Icon Basilikè? Considered and Answered,' 8vo., 1824; and 'King Charles the First the Author of Icon Basilikè, further proved,' 8vo. 1828. The claim of Gauden has been strenuously supported by Mr. Hallam and by other writers of authority. Gauden was the acknowledged author of a large number of sermons and tracts.

GAUDENS, ST. [GARONNE, HAUTE.]

GAUGING is the method of determining by actual measurement the number of gallons contained in any vessel intended to hold goods.

GAUL. [FRANCE.]

GAULT, or GOLT, an argillaceous deposit separating the upper from the lower green sand. [CRETACEOUS GROUP.]

GAUZE, a light transparent cloth made of fine silken threads. The texture is different from that of plain weaving, in which the warp, or longitudinal threads, are always parallel to each other: the essential character of gauze-weaving is, that between each cast of the shuttle a crossing of the warp threads shall ensue, and thus the weft (which forms the cross-threads interlaced by the warp) is not brought into absolute contact with the cross-thread immediately preceding. The intervals left between the interlacings cause that degree of transparency which, without such arrangement, could only result from a looseness of texture, incompatible with beauty and utility.

GAVELKIND, a customary tenure in the county of Kent. It seems that this tenure was the common socage tenure among the Anglo-Saxons (Glanvil. lib. 7. c. 3); and the reason of its continuance in Kent has been ascribed to the resistance which the inhabitants of the county made to the Norman invaders. This tenure also prevailed in Wales until the 34th Henry VIII., when it was abolished by statute

The etymology of the word is doubtful. The chief distinguishing properties of this tenure are: 'That upon the death of the owner without a will the land descends to all the sons in equal shares, and the issue of a deceased son, whether male or female, inherit his part; in default of sons, the land descends in equal shares to the daughters; in default of lineal heirs, the land goes to the brothers of the last holder; and, in default of brothers, to their respective issue.'

The husband is tenant by courtesy of a moiety of his wife's lands, without having any issue by her; but if he marries again, not having issue, he forfeits his courtesy. A wife is endowed of a moiety of the lands of which her husband died seised, during chaste widowhood only. Gavelkind lands were generally devisable by will before the statute of wills was passed.

Several statutes have been passed, at the request of holders of Gavelkind lands, to render them descendible according to the course of the common law, or, as it is called, to disgavel them. These statutes however only alter the partible quality of the customary descent; they do not affect the other incidents to the tenure. It is always presumed that lands in Kent are of this tenure, until the contrary is proved. This was one of the tenures proposed to be abolished or modified by the Real Property Commissioners in their third Report. (2 Blackstone, 'Commentaries;' Robinson's 'Gavelkind.')

This customary descent is followed in some manors, particularly in the manors of Stepney and Hackney. (See the customs of these manors printed in 2 Watkins, 'Copyh.' 506.)

GAVIAL. [Crocodile.]

GAY, JOHN, born at or near Barnstaple, in Devonshire, in 1688, began the world as an apprentice to a mercer in London. That employment however he soon forsook, and having published his first piece, 'Rural Sports,' in 1711, he dedicated it to Mr. Pope, and thus established an acquaintance which ripened into a firm and lasting friendship. In 1712 he became secretary to the Duchess of Monmouth, whose service he quitted in 1714 to attend the Earl of Clarendon, ambassador to Hanover, in a similar capacity. This was his introduction to a court life. He sought and obtained the favour of the Prince of Wales, but was neglected after that prince's accession to the throne: and he suffered much from the disappointment. The latter years of his life were spent in the household of the Duke of Queensberry, where he was treated with great kindness and respect. He died December 4, 1732, and was buried in Westminster Abbey, where a monument, with an affectionate inscription by Pope, is erected to him.

Gay wrote several comedies and farces, of which we need only mention the celebrated 'Beggar's Opera,' which was brought on the stage in November 1727, and was acted for 63 following days during that season, besides obtaining similar popularity in other places. His other chief works are the 'Fables,' the 'Shepherd's Week,' and 'Trivia, or the Art of Walking the Streets of London.' Of his minor poems, the favourite ballad of 'Black-eyed Susan' is a good specimen.

GAY-LUSSITE, a mineral so named in honour of the French chemist Gay Lussac. It occurs in imbedded crystals. The primary form is a right rhombic prism. It is very brittle, translucent, slightly soluble in water, and of a dirty white colour. It consists chiefly of carbonic acid, soda, and lime.

GAZA, *now Gazara*, a town in the south-west of Palestine, near the borders of the desert which separates it from Egypt. It consists of the upper town, with a castle situated on a hill, about two miles from the sea, and a lower part in the valley. The population is between 3000 and 4000. Gaza is greatly fallen from its ancient splendour; but it still exhibits signs of commercial activity and prosperity. It is repeatedly mentioned in Holy Writ, especially in Judges (c. xvi.), as one of the principal towns of the Philistines. It was taken by Alexander the Great, after an obstinate defence. The hill upon which Gaza stands is about two miles in circumference at the base, and appears to have been once wholly inclosed by walls. The town being surrounded by gardens and plantations of olive and date trees, above which numerous and elegant minarets rise, has a pleasing appearance from a distance. (Jolliffe's *Letters from Palestine*; Irby and Mangles' *Travels*; Richardson.)

GAZA, THEODORE, a learned Greek scholar, born at Thessalonica in the early part of the fifteenth century, emigrated to Italy, at the time of the fall of the Eastern Empire. He found liberal patrons in his countryman Cardinal Bessarion, Pope Nicholas V., and King Alfonso of Naples. Gaza translated into Latin Aristotle's 'History of Animals;' the 'History of Plants,' by Theophrastus; the 'Aphorisms' of Hippocrates, and other Greek works. He also wrote a Greek Grammar, which was published at Rome in 1495. Gaza died at Rome, or, as some say, in Calabria, at an advanced age.

GAZELLE. [Antelope.]

GAZETTE (*gazetta* in Italian, *gaceta* in Spanish) is the name given to newspapers in several parts of the Continent. This name was, according to Ménage and others, derived from a small Italian coin, which was the price of the first newspaper established in that country. In England the London Gazette is an official newspaper, containing the proclamations, orders in council, promotions, bankruptcies, &c.

Gazetteer has been used in England to signify a geographical dictionary, such as Brookes' 'General Gazetteer,' and other similar works. [Dictionary.]

GEARING, or GEERING, in machinery, is a term somewhat indefinitely applied to a train of toothed wheels, or other similar contrivance for transmitting motion. Coupling [Coupling] may in some cases be considered a kind of gearing: and the expression 'to throw machinery into or out of gear' is commonly applied to the act of engaging or disengaging such connections.

GEBERS. [Geometry]

GEBHARDI, a German author, born in 1709 at Brunswick, died at Lüneburg in 1773. His most important work is a 'Universal Genealogy,' published in 1733–81, in German, which served

as a basis to all the genealogical works published by the Germans during the 18th century. Gebhardi also wrote 'Historical and Genealogical Memoirs,' 3 vols. 8vo. His son published, after his father's death, a collection of materials for a genealogical history of the reigning families of Germany, which was left in manuscript by Gebhardi.

GECARCI'NUS, Dr. Leach's generic name for those brachyurous decapod Crustaceans known familiarly to the English as *Land-Crabs*, and to the French by the appellations of *Tourlouroux*, *Crabes Peintes*, or *Crabes Violets*, some of these terms being applicable not only to different species, but to the same species at different ages, so that those various names cannot be depended upon as specific designations. [CRAB.]

According to Milne Edwards, the tribe of *Gecarcinians* is one of the most remarkable groups of the class *Crustacea;* for it is composed of animals breathing by means of branchiæ, or gills, and yet essentially terrestrial, so much so indeed, that they would perish from asphyxia if submerged for any length of time. They may be distinguished easily from the rest of the family by their nearly oval carapace, which is much elevated and convex above. The branchial regions are in general very distinct, and project much below, occupying nearly two-thirds of the surface. The front is very nearly as large as the buccal frame (*cadre buccal*), and strongly curved below. The orbits are sub-oval, moderate, and very deep. The lateral borders of the carapace are very much arched, and generally describe a semicircle. The internal antennæ are lodged under the front, and fold back transversely in narrow and often nearly linear excavations. The disposition of the external antennæ varies, and so do the jaw-feet (*pattes-mâchoires*); sometimes the fourth joint is inserted at the external angle of the preceding, and remains exposed, as in the *Ocypodians*, and sometimes it is entirely hidden under its internal surface. The feet of the first pair are long and strong; the succeeding feet are robust and long, and very nearly equal in size, and their tarsus is pointed and quadrilateral. The abdomen of the male is received in a deep excavation of the external plastron, and its second articulation reaches nearly always to the base of the posterior feet. It is in general so long that it comes up to the base of the mouth, and the appendages hidden beneath it are remarkably large. The branchiæ are generally seven in number, namely, five fixed to the vault of the sides, and two, in a rudimentary state, hidden under the base of the preceding, and taking their origin from the jaw-feet; but in some species there are nine on each side. The respiratory cavity is very large, and is raised into a vault highly elevated above the branchiæ, so that above those organs there is a large empty space. The tegumentary membrane with which it is lined is also very spongy, and sometimes forms a fold along the lower edge of the cavity, so as to form a kind of gutter, or longitudinal trough for containing water when the animal remains exposed to the air. (Milne Edwards.) Observations on this curious reservoir were communicated to the Royal Academy of Sciences in France by MM. Audouin and Milne Edwards some years ago, wherein the authors show that in all the crustacea the branchiæ are fitted to perform the functions of respiratory organs in the air as well as in the water; that the more or less rapid death of the aquatic species, when exposed to the air, depends upon various causes, of which one of the most direct is the evaporation from the branchiæ, which produces their desiccation; that consequently one of the conditions necessary to the support of life in animals which have branchiæ, and live in the air, is the having these organs defended against desiccation; and lastly, that these dispositions actually occur in the Land-Crabs, which all possess various organs destined for absorbing and keeping in reserve the quantity of moisture necessary for maintaining a suitable degree of moisture in the branchiæ.

The Land-Crabs, or *Gecarcinians*, inhabit the warm countries of the New and Old World, and Australasia; but, as far as observation has hitherto gone, America and its islands seem to be the places where the form is most highly and most numerously developed. Almost every writer on the Natural History of the countries last mentioned treats largely on the habits of these creatures, and in the works of Rochefort ('Histoire Naturelle des Antilles'), De Feuillée ('Observations faites sur les Côtes d'Amerique'), De Labat ('Nouveau Voyage aux Isles d'Amerique'), Sloane ('Natural History of Jamaica'), Browne ('Civil and Natural History of Jamaica'), Hughes ('Natural History of Barbados'), Catesby ('Natural History of Carolina'), &c., will be found details more or less ample, and highly interesting, of their manners; though most of the writers do not determine the species sufficiently to enable us to judge of what particular Land-Crab they are writing. All these authors will however well repay the trouble of consulting them.

Latreille sums up what he considers the credible parts of these narratives thus:—The crabs pass the greatest part of their life on land, hiding themselves in holes, and not coming forth till evening. Some keep about cemeteries. Once a year, when they would lay their eggs, they assemble in numerous bands, and move in the shortest direction to the sea, without caring for any obstacles. After they have finished their deposit, they return much weakened. It is said that they block up their burrows during their moult; and while they are undergoing this operation, and are still soft, they are called *Boursiers* (Purse-Crabs), and their flesh is then much esteemed, although it is sometimes poisonous. This quality is attributed to the fruit of the manchineel, of which the people think, falsely perhaps, that the crabs have eaten.

The following genera, according to Milne Edwards, are included in the family of *Gecarcinians*.

1. *Uça.*—Example. *Uça una.* Locality, South America.

2. *Cardisoma.*—Example, *Cardisoma carnifex.* Locality, the neighbourhood of Pondicherry.

3. *Gecarcoïdea.*—Example, *Gecarcoïdea Lalandii.* Locality, Brazil.

4. *Gecarcinus.* — Example, *Gecarcinus ruri-*

cola, the Land-Crab, Mountain-Crab, or Violet-Crab of the Antilles.

GECKO, GECKO'TIDÆ, *Gecko Family*, a natural family of Saurians.

Their head is wide and flattened, with the mouth wide; the nostrils are distinct and lateral; the eyes large, hardly surrounded by short lids, the lower edge of which in the greater number of species does not project outwards, the pupil sometimes rounded, but most frequently dentilated, linear, and lightly fringed; and the auditory opening bordered with two folds of the skin. The teeth are small, equal, compressed, sharp at the point, entire, and planted in the internal edge of the jaws: there are none on the palate. The tongue is short, fleshy, capable of but little elongation, and free at its extremity, which is either rounded or flattened, or very slightly notched.

Their neck is apparently little, in consequence of the width of the back part of the head and the squareness of the shoulders. Their body is thick and short, depressed, and low on the legs, with a belly flat below, dragging on the ground, and largest in the middle. There is no crest on the back. The tail varies, but is not long, and often has folds or circular depressions, but never a dorsal crest.

The feet are short, nearly equal in length, wide apart, and robust; the toes nearly equally long, most frequently flattened below, widened, and furnished with transverse imbricated plates; the nails vary, but they are ordinarily hooked, sharp, and retractile. The conformation of the feet enables the Geckos to run with ease on the smoothest surfaces in every direction, or to remain stationary on them with the back downwards, after the manner of a common house-fly.

The skin is defended by equal granular scales, most frequently interspersed with other tubercular scales, the points blunt or angular. There are femoral pores or pores in front of the vent, on the same line, in the majority of species, and most frequently in the males only. The limbs and sides are sometimes bordered with fringed membranes.

Habits, Food, &c.—The Geckotidæ are none of them large in size, and the greatest number feed on small animals, such as insects, their larvæ, and pupæ. These they catch either by lying in ambush or by pursuing their feeble prey in the holes and dark crevices to which it retires. The structure of their feet enables them to run in every direction over the smoothest surfaces, and they can even remain suspended beneath the large leaves which a luxuriant tropical vegetation so frequently puts forth. The sharp and retractile nails with which the feet of the greater number are armed enable them to cling to and make rapid progress on trees with the smoothest bark, to penetrate the holes of rocks, and to climb walls. Of sombre or varying colours adapted generally to the locality where their lot is cast, they will often remain for hours in positions as extraordinary as the flies and insects for which they watch, the wonderful apparatus with which their feet is furnished enabling them to overcome the general law of gravity, and without which they would instantly fall to the earth. The hues of their skins thus render them less objects of suspicion to the little animals for which they lie in wait, and also serve to dodge even the acute eye of the bird of prey that seeks to destroy them. Their eyes, as we have seen, enable them to discern objects in the dark, and are at the same time capable of bearing the rays of a bright sun; for many insects are nocturnal or crepuscular, while the great mass of them are diurnal. The pursuit of their prey leads them near the habitations of man, whose dwelling always attracts certain kinds of insects, and they sometimes fall victims to their appearance, which frequently inspires terror, and often disgust. A Gecko, confident in his powers of flight, appears boldly to await his adversary, and his sudden disappearance at a nearer approach adds to the horror which his uncouth form inspires. The poor Geckos too have a bad name. They are supposed to poison whatsoever they touch, be it animate or inanimate, and their saliva is said to vex the skin of those on whom it falls with foul eruptions. Many of those cuticular irritations, when they have actually existed from the intervention of these animals, may have arisen from the extremely sharp claws of a Gecko running over a sleeping man, or small blisters may have been raised by the adherent apparatus at the bottom of its feet.

Geographical Distribution.—The form is found in all the four quarters of the globe, and is widely distributed in warm climates. In this distribution Europe, as far as observation has yet gone, claims by far the fewest number. Two species only have yet been found in this quarter of the globe, and even these are common to the northern coasts of Africa. The Prince of Musignano has noticed them in the 'Fauna Italica,' under the names of *Ascalabotes Mauritanicus* and *Hemidactylus triedrus*. The former is a Platydactylus of Duméril and others. In Asia the greatest number are found: 13 species are recorded as Asiatic. Africa is said to possess 12, and America 11 species, as far as researches have hitherto gone. In Australasia and Polynesia there are said to have been found 12 species. M. Duméril, in his Table, gives the following numbers:—In Europe, 2; in Asia, 13; common to both, none. In Africa, 12; in America, 12; common to both, none. In Australasia and Polynesia, 12. Of unknown origin, 4: = 55. In addition to the 13 Asiatic species, there is another which is also found in South Africa and in the neighbouring islands. Some of the African species are found also in Madagascar, the Mauritius, and the islands of Seychelles, Teneriffe, and Madeira. It is not clear that Mr. Gray's genus *Gehyra*, which he characterises from a Gecko found in an island of the Pacific Ocean, is included in this enumeration. Besides the species which Mr. Gray describes in the 'Zool. Proc.' (1834), he alludes to the probability of two other species, one in the British Museum, and another in the Muséum d'Histoire Naturelle, at Paris.

GEDDES, ALEXANDER, LL.D., was born at Arradowl, in Banffshire, Scotland, in 1737. After spending seven years at a Roman Catholic

seminary in the Highlands, he was removed at the age of twenty-one to the Scotch college in Paris, where he diligently studied theology, and made himself master of most of the modern European languages. On his return to Scotland he resided for some time in the house of the Earl of Traquair; and, after paying another visit to Paris, he accepted, in 1769, the charge of a Catholic congregation at Auchinhalrig in the county of Banff, where he remained for ten years, beloved by his people, and attentive to the duties of his station. On his removal to London in 1779, he was introduced to Lord Petre, who warmly approved of his purpose of making a new English translation of the Bible for the use of the Roman Catholics, and engaged to allow him 200*l.* a year for his life. In accomplishing this work, his first object was directed to obtaining an accurate text. He consulted the most eminent biblical scholars of the day, among whom were Dr. Kennicott, and Dr. Lowth, the Bishop of London, who assisted him with their advice. It was not till 1792 that the first volume of the translation was published under the title of 'The Holy Bible, or the Books accounted sacred by the Jews and Christians, otherwise called the Books of the Old and New Covenants, faithfully translated from corrected texts of the originals, with various readings, explanatory notes, and critical remarks;' the second, which contained the translation to the end of the historical books, appeared in 1793; and the third, which contained his critical remarks upon the Pentateuch, in 1800. The remainder of the work was never finished; he was employed at the time of his death on a translation of the Psalms, which he had finished as far as the 118th Psalm, and which was published in 1807. He died at London on the 26th of February, 1802, in the 65th year of his age.

In his translation and commentary Dr. Geddes maintained opinions very similar to those held by that class of divines in Germany denominated Rationalist, and of whom Eichhorn and Paulus were the most celebrated in his day. His own church was the first to condemn the views of Dr. Geddes. A pastoral letter, signed by three out of four of the apostolical vicars of England, forbade the faithful from reading his translation; and Dr. Geddes himself was soon afterwards deposed by the apostolical vicar of the London district from the exercise of his duties as a priest. Though the opinions of Dr. Geddes were detrimental to the authority of the Scriptures, we have no reason on that account for charging him with infidelity, since he believed that his interpretation of the Scriptures tended to place Christianity on a firmer basis, and that 'those were the enemies of religion who seek to support her on rotten props, which moulder away at the first touch of reason, and leave the fabric in the dust.' His translation is described by Dr. Mason Good ('Life of Geddes,' p. 358) to be, 'for the most part, plain and perspicuous, conveying the sense of the original in its native simplicity. But his language is occasionally unequal, and strongly partakes of the alternations of his own physical constitution; in consequence of which, in the midst of a passage most exquisitely rendered in the main, we are at times surprised with scholastic and extraneous expressions, or disgusted with intolerable vulgarisms.' It cannot be denied that his work was a valuable help to the science of biblical criticism in this country. In the midst of the virulence with which he was assailed in England, such men as Paulus and Eichhorn appreciated his labours; the latter of whom observed that Dr. Geddes was the only individual by whose opinion he would consent to be judged. A complete catalogue of Dr. Geddes's works is given in the beginning of Dr. Mason Good's 'Memoirs of the Life and Writings of the Rev. Alexander Geddes, LL.D.,' published in 1803.

(See Graves *on the Pentateuch*, and the 4th, 14th, 19th, and 20th volumes of the *British Critic*, old series, for a review of his theological opinions.)

GEDIKE, FRIEDRICH, born at Boberow, near Lenzen in Brandenburg in the year 1754, was educated at the Orphan Asylum at Züllichau. Dr. Steinbart, who was director of the public institutions for instruction in this place, educated him seven years at the Asylum. In 1766 Steinbart founded a school of his own, where Gedike became a pupil, and here his talents began to manifest themselves. He went to the university at Frankfort in 1771, and studied under Töllner. On the death of Töllner, Steinbart, who succeeded him, once more became his instructor. In 1775 Spalding appointed Gedike private teacher to his two sons, and in 1776 he was made sub-rector of the Friedrichwerder Gymnasium at Berlin, of which in a few years he became director. Indefatigable in devising new methods of instruction, and constantly aiming at improvements, he animated both pupils and tutors, and raised the almost sinking establishment to a high eminence. He became in 1795 director of the Berlin Gymnasium. He died in 1803.

The works of Gedike are chiefly school-books and works on education, but he also published an edition of the 'Philoctétes' of Sophocles, and of select dialogues from Plato, as well as some translations of Pindar.

GEE, JOSHUA, was an eminent London merchant of the earlier part of the eighteenth century. He was one of the authors of the periodical called 'The British Merchant,' which was set up in 1713 in opposition to the commercial treaty with France which was proposed by ministers after the peace of Utrecht, and which contains perhaps the most complete exposition that has been given of what is called the Mercantile or Balance of Trade theory. It also forms a record of the state of many branches of our commerce at the period. (See a full account of it in the 'Pictorial History of England,' vol. iv. pp. 207–213.) Gee however is best known by his separate work, entitled 'The Trade and Navigation of Great Britain considered,' first published in 1729 or 1730, of which several later editions appeared. In this Gee endeavours to show 'that the surest way for a nation to increase in riches is to prevent the importation of such foreign commodities as may be raised at home,' and 'that this kingdom is capable of raising within itself and its colonies materials for employing all our poor in those manufactures

which we now import from such of our neighbours who refuse the admission of ours.'

GEERTRUYDENBERG. [BRABANT.]

GEHLENITE, a mineral which occurs in imbedded and massive aggregations of rectangular or slightly rhombic crystals, grayish in colour, and slightly translucent. It consists chiefly of silica, alumina, and lime.

GELA, a Grecian colony on the south-western coast of Sicily, was founded by a joint colony from Crete and from Lindus, a city in Rhodes, forty-five years after the foundation of Syracuse. (Herod., vii. 153; Thuc., vi. 4.) Gela was one of the most powerful of the Grecian colonies in Sicily, and continued so to the time of Gelon. [GELON.] The modern town of Terra Nova is supposed to have been built upon its site.

GELA'SIUS I. succeeded Felix II. as bishop of Rome, A.D. 492. He died in 496, and was succeeded by Anastasius II.

GELA'SIUS II. a Benedictine monk, succeeded Paschal II., A.D. 1118. The popes were then at open war with the emperors of Germany; and the partisans of the latter at Rome, headed by the powerful family of Frangipani, opposed the election of Gelasius, and afterwards seized him and personally ill-treated him, until he was rescued from their hands by the prefect of Rome. Soon after, the Emperor Henry V. came himself with troops, and, the Pope having run away to Gaëta, an anti-pope was elected by the Imperial party, who styled himself Gregory VIII. Gelasius, after many wanderings, repaired to France, where he held a council at Rheims. He died at the convent of Cluny, in January 1119, and was succeeded by Calixtus II.

GELATINE. [FOOD.]

GELDER ROSE, or rather *Gueldres Rose*, a double variety of the *Viburnum opulus*, a marsh shrub, common in this country and all the north of Europe. The name of this variety is supposed to indicate its origin in the Low Countries: it is also called the Snowball-Tree, in allusion to its large white balls of flowers.

GELE'E, CLAUDE. [CLAUDE, LORRAINE.]

GELL, SIR WILLIAM, born in 1777, was a younger son of Philip Gell, Esq., of Hopton, in the county of Derby. Sir William was educated at Jesus College, Cambridge. He was for some time a fellow of Emanuel College. He had already spent much of his time abroad, as his publications show, when, on the Princess of Wales leaving England in 1814, she appointed him one of her chamberlains. He attended the princess in various parts of Italy, as appears from his evidence at the bar of the House of Lords in the course of the proceedings taken against her as Queen Caroline, in 1820. After this, Gell returned to Italy, and he resided mostly at Naples till his death, on the 4th of February, 1836.

His first work was 'The Topography of Troy and its Vicinity, illustrated and explained by Drawings and Descriptions,' folio. This was followed by 'The Geography and Antiquities of Ithaca,' 4to., 1808; 'The Itinerary of Greece, with a commentary on Pausanias and Strabo, and an account of the Monuments of Antiquity at present existing in that Country,' 4to., 1810; 'The Itinerary of the Morea, being a particular description of that peninsula, with a map of the routes,' 8vo., 1817; 'Pompeiana, or Observations upon the Topography, Edifices, and Ornaments of Pompeii' (in conjunction with J. P. Gandy, Esq.), 2 vols. 8vo., 1817-19; 'Attica,' folio, 1817; 'Narrative of a Journey in the Morea,' 8vo. 1823 (the journey having been performed in 1804); 'The Topography of Rome and its Vicinity,' 2 vols. 8vo., 1834 (an important work in reference to the cities anciently existing in the Campagna di Roma); 'Rome and its Environs' (a map), 1834. Gell was a good draughtsman, and he has the merit of having carefully examined and delineated many monuments of antiquity. Some of his works are hurried performances; but they have all some value as being the results of actual observation.

(Notice in *Gentleman's Magazine* for June 1836, p. 665; and Gell's *Works*.)

GELLERT, CHRISTIAN FURCHTEGOTT, born near Chemnitz, in Saxony, acquired a great reputation as a writer of fables and as a moralist. He also wrote 'Sacred Odes and Songs,' and his 'Letters' have been published. His complete works form part of the 'Karlsruher Deutscher Classiker,' 1823-6. His fables and letters were translated into French, 5 vols. 8vo., with a biographical notice of the author. Gellert died at Leipzig, where he was professor of philosophy, in December 1769, and a monument was raised to him in the church of St. John, with a cast of his head in bronze. The bookseller Wendler, who published his works, also raised a monument to the memory of Gellert in his garden.

GE'LLIUS, AULUS (or, according to some writers, Agellius) the author of the 'Noctes Atticæ,' was born at Rome in the early part of the second century, and died at the beginning of the reign of the Emperor Marcus Aurelius. He studied rhetoric under Cornelius Fronto at Rome, and philosophy under Phavorinus at Athens. The 'Noctes Atticæ' was written, as he informs us in the preface, during the winter evenings in Attica, to amuse his children. It appears from his own account, that he had been accustomed to keep a commonplace book, in which he entered whatever he heard in conversation or met with in his private reading that appeared worthy of memory. The 'Noctes' contains anecdotes and arguments, scraps of history and pieces of poetry, and dissertations on various points in philosophy, geometry, and grammar. Amidst much that is trifling and puerile, it gives information on many subjects relating to antiquity, of which we must otherwise have been ignorant. It is divided into twenty books, which are still extant, with the exception of the eighth and the beginning of the seventh. The 'Noctes Atticæ' was printed for the first time at Rome, 1469, and has been frequently reprinted; the most valuable edition is by Gronovius, 4to., 1706. It was translated into English by Beloe, 3 vols. 8vo., London, 1795; and into French, by Douzé de Verteuil, 3 vols. 12mo., Paris, 1776-1777.

GELON, a native of Gela, rose from the station of a private citizen to be ruler of Gela and Syra-

cuse. During the reign of Hippócrates at Gela (B.C. 498–491), Gelon was appointed commander of the cavalry, and distinguished himself in the wars of Hippocrates against the Grecian cities in Sicily. On the death of Hippocrates, who fell in a battle against the Siceli, Gelon seized the supreme power (B.C. 491). Soon afterwards a more splendid prize fell in his way. The nobles and landholders of Syracuse, who had been expelled by an insurrection of their slaves supported by the rest of the people, applied to Gelon for assistance. He marched to Syracuse, into which he was admitted by the popular party (B.C. 485), who had no means of resistance. (Herod., vii. 154, 155.) Having become master of Syracuse, he appointed his brother Hieron governor of Gela. In order to increase the population of Syracuse, he destroyed Camarina, and removed the inhabitants, together with a great number of the citizens of Gela, to his favourite city. As he was indebted for his power in Syracuse to the aristocratical party, he took care to strengthen it against the people. By his conquests and his great abilities he had become a powerful prince, and, when the Greeks expected the invasion of Xerxes, ambassadors were sent to Syracuse to secure his assistance. Gelon promised to send a large force provided the supreme command were given to him. This offer being rejected by the Lacedæmonian and Athenian ambassadors, Gelon sent, according to Herodotus, Cadmus to Delphi with great treasures, with orders to present them to Xerxes if he proved victorious in the war. (Herod., vii. 157–164.) This however was denied by the Syracusans, who said that Gelon would have assisted the Greeks if he had not been prevented by an invasion of 300,000 Carthaginians under Hamilcar. This great army was defeated near Hímera by Gelon, and Theron, monarch of Agrigentum, on the same day on which the battle of Salamis was fought. (Herod., vii. 165—167.) An account of this expedition is given by Diodorus (xi. p. 254, Steph.), who states that the battle between Gelon and the Carthaginians was fought on the same day as that of Thermópylæ.

Gelon appears to have used his power with moderation, and to have endeared himself to the Syracusans by the equity of his government and the encouragement which he gave to commerce and the fine arts. There are still existing many coins of Gelon and his successor Hieron, of beautiful workmanship, of which a description is given in Mionnet, vol. i. p. 328. We are informed by

Coin of Gelon.
British Museum. Actual size. Silver. Weight, 98 grains.

Plutarch, that posterity remembered with gratitude the virtues and abilities of Gelon, and that the Syracusans would not allow his statue to be destroyed with those of the other tyrants, when Timoleon was master of the city. ('Timoleon,' c. 23.) He died B.C. 478, and was succeeded by his brother Hieron.

GE'MINI (the Twins), the third constellation in the Zodiac. The Greeks refer it not only to the fable of Castor and Pollux, but also to those of Hercules and Apollo, Triptólemus and Iasion, Amphíon and Zethus, &c.

This constellation derives its name from two remarkable stars, of the first and second magnitude, to which the names of Castor (or α Geminorum) and Pollux (or β Geminorum) are given. These two stars, whose proximity will cause them to be easily recognised when once known, may be found by drawing a line through the belt of Orion and the two bright stars the line of which cuts through the belt. This line, lengthened upwards, will pass very near to the two stars of Gemini. They are also about halfway between Regulus and Aldebaran: and, if the Great Bear and Orion be seen together, then Capella on the one side, and Castor and Pollux on the other, will be conspicuous boundaries of the intermediate space.

GEMINIA'NI, FRANCESCO, was born at Lucca, about the year 1680. The foundation of his musical knowledge was laid by Alessandro Scarlatti, but he completed his studies under Corelli. Geminiani arrived in London in 1714, where his performance on the violin speedily gave him celebrity. Although favoured by the court, his habits of extravagance kept him poor during the greater part of his life. He arranged several of Corelli's solos and sonatas as concertos for a band; he composed six orchestral concertos, twelve sonatas for violin and base, and several other pieces, and wrote a Guide to Harmony, which is highly estimated. Geminiani died at Dublin in 1762.

GEMS. [Cameo; Intaglio.]

GENDARMERIE (from *Gens d'Armes*, men-at-arms) was a chosen corps of cavalry under the old monarchy of France. The gendarmerie were afterwards formed into a body of soldiers intrusted with the police all over France; it furnishes patrols, arrests criminals, examines the passports of travellers, and contributes to the maintenance of good order. They are divided into foot and horse. They form a distinct corps in the army, under their own superior officers, who are under the orders of the ministers of the interior and of police; but, in case of war, they may be called into active service like the other corps of the army. The gendarmerie is mostly recruited from old and deserving soldiers of other regiments, who consider it as a promotion, as they have better pay and enjoy greater liberty. This explains why the gendarmes, generally speaking, are remarkably well-behaved and trusty men. The same description of troops exists in the Italian states, where they are called Carabineers.

GENDER is a grammatical principle entering into the structure of nearly every language, according to which nouns are distributed into classes. There are, strictly speaking, only two genders, *masculine* and *feminine;* those which belong to neither of those classes were said to be

neutrius generis, of neither gender: this third class are called somewhat incorrectly *neuters*, and hence by a second irregularity it is the ordinary practice of grammarians to speak of three genders.

GENDRE, LE. [LE GENDRE.]

GENEALOGY. [CONSANGUINITY; DESCENT.]

GENERAL, a title conferred on military men above the rank of field-officers. In all the states of Europe it indicates the commander-in-chief of the forces of the nation, the commander of an army or grand division, and also those who, under the latter, exercise his functions, with the designations of lieutenant-general and major-general.

The origin of the title appears in the history of France, in which country it seems to have been conferred on the commander of the royal army about the middle of the fifteenth century, when something like a regular military force was first established in Europe. The kings were then considered as holding the chief command of the army in virtue of their birth; and, on appointing persons under them to exercise a general superintendence of the forces, they gave to such officers the title of *lieutenant-general*. It must be remarked however that, at a period more early than that of the creation of lieutenant-generals under the sovereign, the title of captain-general had been conferred on certain officers with military jurisdiction over particular districts; and the nature of the duty therefore seems to have resembled that of the inspecting field-officers now appointed to particular divisions of this country and the colonies.

The English nation has nearly followed the practice of France in matters appertaining to the military service, and the title of captain-general occurs in the list of the army which served at St. Quentin in 1557, of which list a copy is given by Grose from a MS. in the British Museum. From the same list it appears that a lieutenant-general for the whole army was immediately subordinate to the former; and that under the last was a general of horse, a captain-general of foot, with his lieutenant, and a serjeant-major (corresponding to a present major-general). In the army which, in 1620, it was proposed to raise for the recovery of the Palatinate, and in that raised by Charles I. in 1639, the commander is entitled the lord-general; a lieutenant-general appears as the second in command, and the third is designated as serjeant-major-general. It was probably soon after this time that the last officer was called simply major-general; for we find that in 1656 Cromwell appointed twelve officers under that title to have civil and military jurisdiction over the counties of England. (Clarendon, b. 15.)

In France, during the reign of Louis XIV., and perhaps at an earlier time, the naval commander immediately below the rank of vice-admiral was entitled lieutenant-general. A similar designation seems to have been early employed in the English service, for in the time of Queen Elizabeth the commander of a squadron was called the general; and, as late as the time of the Commonwealth, a joint commission of admiral and general was given to Blake and Montague, though the expedition on which the fleet was sent was confined to an object purely naval.

In the British service, in the present year, 1848, there are 61 full generals, 127 lieutenant-generals, and 182 major-generals; but of this number many command particular regiments as colonels, or hold military governments in the country and colonies; some of them have only local rank; and a few have retired from the service, retaining the title, but without receiving the pay or being qualified for obtaining any progressive promotion.

The military *staff* of Great Britain at headquarters consists of the commander-in-chief, the adjutant-general, and the quartermaster-general. The duty of the adjutant-general falls partly under that of the serjeant-major-general in the sixteenth century: in the field he receives the orders from the general officer of the day, and communicates them to the generals of brigades, and he makes a daily report of the situations of all the posts placed for the security of the army.

The quartermaster-general corresponds in part to the harbinger of the army in the sixteenth century. This officer has the charge of reconnoitering the country previous to any change being made in the position of the army; he reports concerning the ground which may be favourable for the site of a new encampment, and upon the practicability of the roads in the direction of the intended lines of route. He also superintends the formation of the encampment and the disposition of the troops in their cantonments.

GENERAL ASSEMBLY OF THE CHURCH OF SCOTLAND. This is the Scottish ecclesiastical parliament, and, unlike the Convocation of the English church [CONVOCATION], is composed of representatives of the laity as well as of the clergy. Its functions are to legislate for the church, and to act judicially against any members of the church for alleged impropriety of conduct or doctrine. The Assembly is thus constituted: 80 presbyteries, each consisting of from 6 to 36 parishes, send to it 218 ministers and 94 elders; Edinburgh sends 2 elders, and 65 other royal burghs send each 1 elder; the 4 universities send each a representative, and Marischall College, Aberdeen, also sends 1: these 5 may be either ministers or elders; lastly, 1 minister and 1 elder represent the churches in India in connection with the church of Scotland. The General Assembly meets annually in May. The speaker is called a Moderator. The kirk of Scotland has 1023 parishes, with 1050 ministers. Each parish has its kirk session for the management of the parochial business. From this an appeal lies to the presbytery; from the presbytery to a synod composed of two or more presbyteries; and lastly, from the synods to the General Assembly, whose decision is final. A Lord High Commissioner represents the king in the General Assembly, but his presence merely implies the sanction of the civil authority. He has no voice there. The assembly only recognises the king as the head of the state with which the church is allied, not as the head of the church.

GENERALISSIMO, the commander-in-chief of an army which consists of two or more grand divisions under separate commanders. The title is said by Balzac to have been first assumed by

Cardinal Richelieu, when he led a French army into Italy, and it has been since occasionally given to officers at the head of armies on the Continent, but it has never been adopted in this country.

GENERATING FUNCTIONS. The term *generating function* is a name given by Laplace to any function of x, considered with reference to the coefficients of its expansion in powers of x, as follows: if

$$\phi x = \psi 0 + \psi 1 . x + \psi 2 . x^2 + \ldots + \psi n . x^n + \ldots .$$

then ϕx is the generating function of ψn. Thus the generating function of n is $x \div (1 - x)^2$, since the coefficient of x^n in the expansion of the preceding is n.

GE'NESIS, THE BOOK OF, is the first of the five books of Moses, and derives its Greek name from the principal event recorded in it, namely, the *creation* of the world and the human race.

Objections have been raised by several critics to the opinion that this book (which objection is applied to the whole Pentateuch) was written by Moses; but their objections have been always met by solid answers, and the genuineness of the Pentateuch, as the authentic work of Moses, has been so completely and satisfactorily vindicated that, in the result, it has been more solidly established, rather than weakened, through the attacks which have been made upon it.

Admitting Moses to have been the author, the book must have been composed in one of three ways: 1st, by immediate revelation of every circumstance from God; 2nd, by a collection of ancient traditions; or, 3rd, from former documents. All these theories have had their supporters. 'We know,' says the editor of the Pictorial Bible, 'that the author of Genesis was one of those holy men of old who wrote as they were inspired by the Holy Ghost (2 Pet. i. 21); and we are aware that Moses in particular gave evidence, by prophecy and miracles, that he declared even known and common facts under a sanction more than human. * * * Still we may conceive of the history given by Moses in Genesis as being derived principally from short memoranda and genealogical tables written by the patriarchs or under their superintendence, and preserved by their posterity until the time of Moses, who made use of them, with additions from authentic tradition or existing monuments, under the guidance of the Holy Spirit, and thus prepared his work.' And, though there is great difficulty in assigning the number of documents, there are strong reasons for believing that the general hypothesis is correct. Thus, two separate accounts are given of the creation in the first three chapters. Some theologians, from a supposed difficulty in the literal interpretation of the first three chapters, have supposed them to be *mythical*. To this it is satisfactorily replied that the style is purely historical, that the difficulties are imaginary, and that the writers of the New Testament refer to the events contained in the first three chapters as real transactions. (Matt. xix. 4; John viii. 44; 1 Tim. ii. 13, 14; 2 Cor. xi. 3; 1 John, iii. 8.)

The chronology of the book of Genesis has occasioned great difficulty. According to the Hebrew text, the deluge happened A.M. 1656, according to the Septuagint, A.M. 2262; the former giving B.C. 4004, and the latter B.C. 5411, as the epoch of the creation. From the Deluge to the common date of the birth of Abraham, the Hebrew text gives 292 years, the Septuagint 1072. This date however it is believed should be sixty years later; so that the birth of Abraham occurred, according to the Hebrew text, A.M. 2008, or B.C. 1996; according to the Septuagint, A.M. 3258 or B.C. 2153. From the date of the birth of Abraham the dates of the chief events that follow may be obtained without difficulty from the text.

The following passages are supposed by most Christian divines to be prophecies relating to Christ:—iii. 15; xii. 3; xviii. 18; xxii. 18; xxvi. 4; xxviii. 14; xlix. 10.

GENET. [VIVERRIDÆ.]

GENE'VA the smallest of the Swiss cantons, except Zug, lies along the shores of the south-western end of the Lake of Geneva, and extends a few miles W. along each bank of the Rhône. It is bounded N. by the canton of Vaud, E. and S. by Savoy, and W. by the French department of Ain. The area of the canton is 91 square miles; the population is 58,666, of whom 38,156 are natives of the canton, 8677 Swiss of other cantons, and 11,833 foreigners; 17,000 of them are Catholics, and 41,666 Protestants of different sects.

The territory of Geneva is confined on the west by the lower offsets of the Jura, and on the east and south-east by the mountains of Voirons and Salève, which are about 4000 feet above the sea. These mountains however are out of the territory of Geneva, which contains only some hills, the highest of which are not 400 feet above the level of the lake. The territory of the canton is divided into three districts:—1. The district north of the Rhône, including a strip of land along the west bank of the lake as far as the borders of the canton of Vaud, beyond Versoix. 2. The district between the Rhône and the Arve, which includes Carouge, a neat well-built town, with a Jewish synagogue, and 4000 inhabitants. 3. The district between the Arve and the east bank of the lake, along which it extends in a narrow strip as far as Hermance. The principal place of this last district is Chesne, consisting of two large villages adjoining each other, which reckon together about 2000 inhabitants. Numerous other villages are scattered about the whole territory; and the immediate neighbourhood of Geneva, both along the banks of the lake and in the direction of the principal avenues leading to the town, exhibits extensive lines and groups of country-houses, which form handsome suburbs. The canton is divided into 37 communes, exclusive of the town of Geneva; it furnishes a contingent of 1760 men to the confederation; and all its citizens from 20 to 45 years of age are exercised and reviewed every year.

The territory of Geneva, though not naturally fertile, is rendered productive by the industry of the inhabitants: about one-third of it is sown with corn, another third is pasture-land, a much smaller proportion is planted with vines, which yield an indifferent sort of wine; the rest consists of woods, orchards, and gardens. The number of cattle is

small. Manufactures and commercial speculations form the principal sources of wealth of the Genevese. Watches and jewellery are now the principal manufactures: they are exported to France, Italy, the Levant, and other countries.

The republic of Geneva originated in the municipal government of the town, to which Charlemagne granted certain privileges and franchises, subordinate however to the bishop, who was styled Prince of Geneva and was an immediate feudatory of the empire. The counts of Geneva, a feudal dynasty grown out of the wreck of the old kingdom of Burgundy, also claimed jurisdiction over the town; and these conflicting claims gave rise to frequent dissension. The line of the counts of Geneva becoming extinct in the 14th century, their inheritance escheated to the house of Savoy, who, after several fruitless attempts to reduce Geneva, acknowledged its independence in 1603.

The church of Geneva adopted the tenets of Calvin; it is even to this day considered as a sort of metropolis by the Calvinist churches of the Continent. Religious dissent however has broken out within its own bosom. A party of zealous religionists, calling themselves evangelicals, have arisen, who charge the majority of the clergy of Geneva with having forsaken the tenets of their Reformer. This party have their chapels and their own schools of theology. The clergy of Geneva are under the discipline of a synod, called La Compagnie des Pasteurs, presided over by a moderator who is changed annually. The Catholics are under the spiritual guidance of the bishop of Lausanne and Geneva, who resides at Freyburg. The sovereign power of the canton is lodged in a council of state consisting of 124 members, named by a representative council, which consists of 274 members, who are elected for 9 years by natives of the canton above 25 years of age. The liberty of the press is guaranteed.

GENEVA is one of the oldest towns in Europe. It is mentioned as an important place by Julius Cæsar ('Bel. Gal.,' i. 7). It is built on two hills divided by the Rhône, where it issues out of the Lake of Geneva. The river forms an island within the town, which is built upon and joined to the two banks by bridges. The district on the north bank is called St.-Gervais. A smaller island, at the very point where the Rhône issues from the lake, is planted with trees and forms a public promenade, on which is a statue of Rousseau. A handsome suspension-bridge is thrown across the river to connect both banks and the island. A quay with fine buildings is constructed along the south bank of the river. The streets in the old part of the town are narrow and steep, the houses high, and the appearance of the streets is rather gloomy. The most remarkable buildings are—the cathedral church of St.-Pierre, the handsome front and portico of which were restored in the 18th century; the Hôtel de Ville, which is a very old and massive building; the Hospital; the Musée Rath, which has some good paintings; the College, which has a library of 50,000 volumes; the Botanic Garden; the Observatory; the Hôtel des Bergues, and the Penitentiary. The town is regularly fortified with ramparts, ditches, and bastions, but is commanded by the hills of La-Batie and St.-Jean, which makes it unfit to stand a regular siege. There are three gates, two on the Savoy or south side, and one on the French or Swiss side.

Geneva abounds with means of instruction. The Academy has 40 professors and 4 faculties—theology, law, sciences, and belles lettres. There are drawing schools; industrial schools in which mathematics, physics, and chemistry, are taught; schools for music, gymnastics, &c. There are also societies of arts, of medicine, of physics and natural history; a reading room, which is supplied with the best European journals and has a library of 30,000 volumes; a museum of natural history; a cabinet of medals, and a botanical garden. The staple manufactures of the town are watches, musical boxes, and jewellery: of watches about 20,000 are made annually.

The town of Geneva, on the whole, is not very prepossessing; but, owing to its beautiful environs and its position on the high road from France to Italy, it is a place of great resort with travellers, of whom in ordinary years about 30,000 pass through it. Steamers ply regularly to Lausanne and other towns on the shores of the lake. In an historical point of view, Geneva possesses considerable interest. On this point reference is made to Berenger, *Histoire de Genève;* Cox's *Travels;* Sénebier, *Histoire Littéraire de Genève.*

GENEVA, a spirituous liquor, which is frequently confounded with gin. It is procured by the fermentation of the berries of the *Juniperus communis.* From the quantity of sugar which they contain they can easily be caused to ferment and yield a spirit. Geneva is a very powerfully stimulating liquor, containing a large proportion of alcohol.

GENEVA, LAKE OF. [LEMAN.]

GENEVRE, MONT. [ALPS.]

GENGIS KHAN, the son of a Mogul chief, was born in 1164. His original name was Temugin, which he exchanged for that of Gengis Khan, *i. e.* 'Khan of Khans,' when he became the supreme ruler of the Moguls and Tartars.

His father died when he was in his fourteenth year; and he was driven by the invasion of the neighbouring princes to the powerful Khan of the Keraites [PRESTER JOÃO] for protection. That prince gave him his daughter in marriage, and raised him to high dignities. But Gengis Khan fell under his suspicion, and returned to his own kingdom for safety, where he defeated the troops sent in pursuit of him, and afterwards the Khan himself (1202), and obtained his dominions. Gradually he united under his authority all the various hordes of Central Asia, and was proclaimed khan of the whole nation in 1206.

He then announced his plan for the invasion of China and Southern Asia, organised armies on a vast scale, and in 1210 poured them upon China. At first, peace was concluded, and Gengis Khan married the daughter of the king of China; but three years later Pekin and the northern provinces of China were annexed to the Mogul empire. In 1218 Gengis Khan with an army of 700,000 men met Mohammed Kothbeddin, the most powerful

of the monarchs of Southern Asia, near the river Jaxartes, and, although the battle was indecisive, Mohammed was ultimately overthrown. Transoxiana, Khorasan, and Persia acknowledged the authority of Gengis Khan before five years more had elapsed; and in 1224 he returned to his capital, Cara-corom, after having plundered and laid waste numerous cities, and destroyed, according to the calculation of oriental historians, five millions of human beings.

His empire now extended from the Volga to the Pacific, and from Siberia to the Persian Gulf; but he was again seeking fresh successes in the southern provinces of China, when he died on the borders of that country on the 10th of Ramadhan A.H. 642, or the 24th of August, A.D. 1227. His son Octai succeeded him, and his two other sons received Transoxiana and Khorasan. The code of laws published by Gengis Khan is still known in Asia.

GENIEZ, ST. [AVEYRON.]

GENII, called in the East *Ginn*, are supposed to be a race of beings created from fire, capable of assuming any form, and becoming invisible at pleasure. They are said in the Koran (c. vi.) to have been created by God. They are supposed to have possessed the world before the existence of man, and to have lost it for their disobedience to God. Much of the happiness and misery of mankind is attributed to them. (An interesting account of the superstitions of the modern Arabs respecting Genii is given in Lane's *Modern Egyptians*, vol. i. p. 283-290; ii. p. 164-166.)

GENISTA, a genus of plants belonging to the natural order *Leguminosæ*. The species have yellow flowers which mostly yield a yellow dye. The *Planta Genista* or Whin, the Gen of the Celts, and the Gênet of the French, was the badge of a long race of English kings, hence called Plantagenets. Upwards of eighty species are included in this genus, but few are applied to any important uses. They are found principally in the south of Europe, and few are natives of Great Britain. *G. tinctoria*, Woad, is a native of Europe, and is found in pastures, fields, and thickets in England. The flowers yield a yellow colour, which is much used for dyeing wool. It has also a medicinal reputation. The seeds act as a mild purgative. *G. monosperma* is a native of Spain, Portugal, Barbary, and Egypt. On the shores of Spain it is found to be very useful in binding the otherwise drifting sand, and by its beautiful fragrant blossoms it converts a barren waste into a garden. Goats feed on the leaves and young branches, of which they are particularly fond.

GENITIVE. [DECLENSION.]

GENIUS, in its original acceptation, denoted the tutelary god or dæmon which, according to an ancient superstition, was allotted to every individual at his birth, to guide him during life, to preside over his fortunes and destiny, and eventually to lead him from existence; and it was supposed that the variety observable in the characters and capacities of different men was dependent upon the higher or lower nature of their attendant genii. Afterwards the word came to signify the disposition itself, without reference to its supposed cause; and lastly, in modern times it has been employed, in a restricted but peculiar sense, to designate either that high mental pre-eminence which is occasionally found in a few individuals, or, by a metonymy, the person possessed of such rare excellence. (Consult *Sharpe's Dissertation on Genius*, London, 1755; *Duff's Essays on Original Genius, and its various Modes of Exertion in Philosophy and the Fine Arts*, London, 1767; and *Lælius and Hortensia, or Thoughts on the Nature and Objects of Taste and Genius*, Edinburgh, 1782.)

GENLI'S, COMTESSE DE. *Stéphanie-Félicité Ducrest de Saint-Aubin* was born near Autun in 1746. Her musical skill introduced her to some persons of distinction; and the elegance of her first writings attracted the attention of the Count de Genlis, who married her. Subsequently the education of the children of the duke of Orléans was intrusted to her care; one of them, Louis Philippe, is the present ex-king of the French. Some works written for her pupils are still popular. During the French Revolution the Comtesse de Genlis was obliged to fly from France, and went successively to England, Belgium, Switzerland, and Hamburg, followed everywhere by the suspicions which her avowed sentiments, her connections with several leading revolutionists, (among others with Lord Edward Fitzgerald, who married her adopted daughter Pamela), and the slander of the royalist emigrants, raised against her. At Hamburg she wrote a kind of political work styled 'Les Chevaliers du Cygne,' and afterwards attempted a justification of her own conduct and sentiments, 'Précis de la Conduite de Madame de Genlis.' She returned to France under the consulship of Bonaparte, who had a favourable opinion of her talents, and she became one of his admirers and panegyrists.

After the Restoration she wrote in defence of monarchy and of religion. When she was past eighty years of age, she wrote her memoirs. She lived to see the events of July 1830, and her former pupil raised to the throne. She died on the 31st of December, 1830, aged 84.

Madame de Genlis wrote numerous novels, of which those styled 'La Duchesse de la Vallière,' 'Les Battuecas et Zuma, ou la Découverte du Quinquina,' are the best. Her works have been published together in 84 volumes, 12mo.

GENNESARET. [PALESTINE.]

GENOA (*Genova*), a division of the kingdom of Sardinia, with the title of duchy, is bounded N. by Parma and Piedmont; E. by Parma, Pontremoli, and Massa; S. by the Gulf of Genoa; and W. by the divisions of Nizza and Coni. It extends from 43° 57′ to 44° 56′ N. lat., and from 7° 35′ to 10° 5′ E. long. The length along the coast is 120 miles, the width of the territory at Savona is about 6 miles, at Genoa 25, and at Chiavari 44. The area is 2103 square miles, and the population amounts to 674,988.

The coast presents numerous indentations, and has several good harbours and two spacious bays —those of Rapallo and Spezzia, which last was called by the Romans Portus Lunae. (Persius, 'Sat.' vi. 9.) The Apennines cover the greater

part of the surface of the duchy, curving round the gulf at the distance of a few miles from S.W. to N.E., and forming two slopes, from the northern of which descend the Bormida, the Orba, the Scrivia, the Staffora, and the Trebbia, all feeders of the Po, while the Gulf of Genoa receives from the southern slope the Centa (called in its upper course the Aroscia), the Polcevera, the Besagno, the Sturla, the Vara, and the Magra. The soil, with the exception of a narrow strip along the coast, is in general not fertile; a great part of it consists of bare and arid rocks; there are however extensive forests and fine pastures on the mountain slopes. The industry of the inhabitants has turned to advantage every spot capable of cultivation; but the produce is not equal to the consumption. The chief products are wine, chestnuts, oil, silk, cotton, hemp, citrons, oranges, lemons, figs, pomegranates, almonds, and other excellent fruits. The aloe flourishes. Marble, alabaster, slate, limestone, asbestos, and coal are found; a good deal of salt is made along the coast. The climate is temperate and salubrious, and the air remarkably pure; the winds in winter however are bitter cold in the mountain ravines, and the sirocco sometimes exerts its noxious influence. The island Galinara, opposite the mouth of the Centa, those of Palmaria and Tino, at the entrance of the Bay of Spezzia, and that of Capraja, near Corsica, belong to the division of Genova. An excellent road, disclosing innumerable views of the most picturesque beauty, runs along the Riviera di Ponente (western shore) from the city of Genoa to Nizza, and along the Riviera di Levante (eastern shore) from Genoa to Sarzana.

The Genoese are a robust, good-looking people, active and industrious; they speak a dialect of Italian, most difficult for a stranger to comprehend. The principal occupations, besides those indicated above, are trading by sea, fishing, and manufactures of jewellery, velvet, embroidered cambrics and muslins, cloth, furniture, both plain and ornamental, &c. The costume of the women is singularly graceful.

The duchy is divided into 7 provinces, which with the area, *mandamenti*, and population in each, are as follows :—

Provinces.	Area in sq. Miles.	Mandamenti.	Pop. in 1838.
Albenga . .	263	7	57,763
Bobbio . . .	269	4	34,337
Chiavari . .	353	7	107,953
Genova . . .	359	13	266,356
Levante . .	259	6	73,139
Novi . . .	289	6	61,847
Savona . . .	311	6	73,593
Total. . .	2103	49	674,988

Albenga and Bobbio have been noticed before.

The province of Chiavari, which contains 28 *comuni*, lies between the province of Genova and Levante, and is watered by the Vara, a feeder of the Magra, and the torrent of Rapallo, which falls into the Bay of Rapallo. The strip of land along the coast is very productive; the mountains abound with chestnut woods. The inhabitants are chiefly employed on the sea. *Chiavari*, the capital of the province, is beautifully situated on the Bay of Rapallo; it is a well-built busy town, with 9828 inhabitants. The houses are generally built on open arcades. It has several fine churches, the principal of which, that of Madonna-del-Orto, is annexed to the ecclesiastical seminary. The Franciscan convent, in the great square, is an imposing building. There are several old and picturesque towers in the town, the largest of which is now used as the office of the podestà. The town has a college; a Società Economica for the encouragement of agriculture, literature, and the arts. It is famous for the manufacture of light willow chairs. *Borzonasca*, a large village inland among the Apennines, is important for its cloth manufactures. *Lavagna*, famous for its slate quarries, has about 3000 inhabitants. *Rapallo*, a flourishing town with 9300 inhabitants, extends along the shores at the head of the Bay of Rapallo. It is well built; the houses stand chiefly on arcades; there are many pretty churches with peculiarly graceful campanile towers, and on the seashore there is a fine martello tower. The chief manufactures are lace and oil. *Santa-Margherita*, a pretty village on the shore, near the promontory of Porto Fino, has, including the district about it, 6000 inhabitants. *Sestri-di-Levante*, E. of Chiavari stands on a peninsula connected with the Riviera by a long isthmus, and has 4000 inhabitants, who are engaged in the coasting trade and in the marble quarries of the neighbourhood. *San-Stefano-d'Aveto* in the interior, stands on a high hill, and has 5700 inhabitants. *Varese*, a small town of 2000 inhabitants, lies E. of Chiavari, on the Vara.

The province of Genova lies W. of that of Chiavari, and contains, besides the city of Genoa, the following towns on the east coast :—*Recco*, a pretty place with 4000 inhabitants. *Nervi*, a gay-looking town, with painted houses, situated also E. of Genoa, among luxuriant gardens close to the shore; population, 3000. The following towns are on the shore to the west of Genoa. *Sestri-di-Ponente*, a flourishing place with about 4000 inhabitants. *Pegli*, population 3000. *Volantri*, a prosperous town with several fine churches, paper-manufactories, and 4000 inhabitants.

The province of Levante lies between that of Chiavari and the eastern boundary of the division. It is watered by the Magra, and its feeder the Vara. The eastern part of the province forms part of the territory of Lunigiana, which was named from the ancient town of Luna, now in ruins, on the left bank of the Magra. The river Magra is interesting as having been the boundary between Etruria and the territory of the ancient Ligures. The capital of the province is *Spezzia*, which stands at the head of the fine Bay of Spezzia in a most beautiful country, and has 9790 inhabitants. It is neatly built; the most remarkable structures are the old Genoese citadel, and the ancient castle of the Visconti. In the bay, close to the town, the remarkable appearance called *Polla* may be seen, which is a hemispherical swell of the sea, caused

by the gush of a submarine spring of great abundance and power. The diameter of the Polla at this place is 25 feet. *Porto-Venere* is a small but interesting town of 2040 inhabitants, opposite the isle of Palmaria. On the opposite side of the Gulf of Spezzia is *Lerici*, which is a station for coasting vessels between Genoa and Leghorn, and has 4000 inhabitants. *Levanto*, a town of 4000 inhabitants, surrounded by overhanging hills, stands in the western part of the province. *Sarzana*, on the left bank of the Magra, in the Lunigiana, is a pretty town with 7670 inhabitants. It is the seat of a bishop, and has a cathedral which is a fine specimen of the Italo-Gothic. The castle and the old fortifications are remarkable for their massiveness.

The province of Novi contains 36 *comuni*, and lies on the northern side of the Ligurian Apennines. It is drained by the Scrivia, and by the Lemmo and other mountain torrents which swell the Orba, a feeder of the Bormida. The province is not productive except in its northern part, which opens into the plain of the Po, and is planted with vines, mulberries, and other fruit trees. The mountains supply fine pasture, or are covered with chestnut woods. *Novi*, the capital, a cheerful well-built town, stands in a plain at the foot of the Apennines, on the road from Genoa to Turin, and has a considerable transit trade and 10,278 inhabitants. It has several fine churches and palaces, and a college. *Voltaggio*, at the foot of the mountain group called La Bocchetta, has a population of 2200. *Serravalle*, on the left bank of the Scrivia, is a bustling little town with 3000 inhabitants. *Gavi*, important from its position in a defile in the mountain, and commanded by a strong castle, stands on the old road from Genoa to Turin, and has 2000 inhabitants. *Pozzuolo* and *Arquata* are towns of about 3000 inhabitants each. Above the latter is a fine ruined castle.

The province of Savona lies between those of Genoa and Albenga, and contains 38 *comuni*. The Apennines rise in this province to only about 1500 feet. The produce consists of fruit, wine, and oil in abundance. *Savona*, the capital, stands on the coast, has a safe harbour for vessels of 200 tons, a considerable trade, and 16,211 inhabitants. The streets are narrow but well built, and present much activity of business. The principal buildings are the cathedral, the Sistine chapel, and near it the Dominican church; the towers on the port, one of which is surmounted by a colossal statue of the Virgin, and the palaces of the resident proprietors of the surrounding country. The churches are adorned with numerous fine paintings. The sanctuary of Madonna di Savona, 5 miles from the town, among the Apennines, is also very rich in paintings. The road from Savona to Genoa, which runs close to the shore, here tunnelled through the rock, there supported by terraces, is one of the gayest and most cheerful roads in the world. Thronged with vehicles of every description, and travellers both mounted and on foot; bordered with the streets of towns, with villages, villas, palaces, or gardens, it presents the aspect of a great and prosperous suburb up to the very gates of 'Genova the Proud.' *Albissola*, the birthplace of Julius II., is a pretty town on the shore, with 3500 inhabitants. *Noli*, once the seat of a bishop, now a small fishing village, lies W. of Savona, between two steep rocks, one of which is crowned by a strong castle. *Cairo*, the ancient *Corium*, stands among the mountains on the Bormida, and has 3500 inhabitants.

(*Nuova Circoscrizione delle Provincie dei Regii Stati in Terra Firma; Informazione Statistiche per gli Stati Sardi*, Torino, 1839; Serristori, *Saggio Statistico;* Murray's *Hand-book of North Italy.*)

GENOA (*Genova*), a city of Italy, situated at the foot of the Ligurian Apennines, in a recess of the Gulf of Genoa, in 44° 24′ 40″ N. lat., 8° 52′ 40″ E. long., 75 miles S.E. from Turin, has, including the garrison and the port, a population of 115,257. It stands partly on the declivity of several hills rising in the form of a semicircle round the spacious harbour, and partly on a narrow strip of ground between them and the sea. It is inclosed on the land side by a double line of fortifications, the external one being above eight miles in length. The higher Apennines rise immediately behind, from which the Bisagno and Polcevera run respectively E. and W. of the city. Upon the summits of these mountains, which are near enough to command Genoa, are several detached forts. The harbour is terminated at either extremity by two piers, the Molo Vecchio and the Molo Nuovo; on the latter is a beautiful lighthouse tower, 300 feet high. The appearance of Genoa from the sea is truly magnificent. A succession of fine buildings more than two miles in length lines the shore; numerous palaces and gardens, churches and convents, rise behind like an amphitheatre on the steep sides of the hills that rear their dark and barren summits above, crowned with formidable ramparts, batteries, and forts. The buildings are square and lofty, and the roofs are covered with light-coloured slate, which has a neat and pleasing effect. The interior of the town is not so pleasant; the streets are very narrow and crooked, dark, and steep, with the exception of the streets Balbi, Nuovissima, Carlo Felice, Carlo Alberto, and Nuova, which are entirely lined with marble palaces belonging to the Genoese patricians. Some of these palaces have galleries of paintings, and their internal decorations and furniture are splendid. The palaces Serra, Durazzo, Doria, Tursi, Doria Panfili, Brignole, Brignole Rosso, Spinola, are among the most remarkable. Genoa has many handsome churches; the cathedral of San-Lorenzo, l'Annunziata, and the elegant church of Santa-Maria di Carignano, San-Siro, San-Matteo, Sant' Ambrogio are among the finest. The Loggia de' Banchi, where is the Exchange, the Ponti or quays of the harbour, the Porto Franco or free-port warehouses, where goods can be deposited and re-exported without paying duty; the Goldsmiths' Street (Strada degli Orefici), the Compera, or Banco di San-Giorgio (St. George's Bank), established in 1346; the theatre Carlo Felice; the promenade of L'Acquasola, the great hospital, and the former palace of the Doges (Palazzo Ducale), are all worthy of notice.

Genoa is the seat of an archbishop; it has a uni-

versity, naval schools, royal college, 6 communal schools, an institution for deaf-mutes, an academy of fine arts, and 4 public libraries. It has an arsenal, and large ship-building yards for the royal navy. The court of appeal for the whole division is held in this city, which is also the residence of a great number of foreign consuls. There is regular communication by steamers with Marseille, Barcelona, Leghorn, Civita Vecchia, &c., and Genoese vessels trade to the Levant, the Black Sea, the Baltic, to America, and even to the coasts of the Pacific. The yearly importations amount to nearly three millions sterling, the exports to somewhat above two millions. The principal articles of export are silk, rice, hemp, oil, and paper. There are at Genoa manufactories of silk stuffs and velvet, woollens, surgical and optical instruments, jewellery and fancy articles, musical instruments, canvas, cordage, paper, and cotton.

History of Genoa.—The origin of Genoa, or Genua (its Roman name), is lost in the obscurity of old traditions which would assign to it an antiquity greater than that of Rome. It is mentioned by Livy, at the beginning of the Second Punic War, when it was taken by Mago, the Carthaginian general, and partly destroyed, but it was soon afterwards restored by an order of the Roman senate. (Livy, xxi. 32; xxviii. 46; xxx. 1.) Strabo (p. 201, Casaub.) mentions Genoa as an emporium of the Ligures. After the fall of the Western Empire, Genoa was taken by the Langobards, A.D. 641. Charlemagne afterwards placed it, with all maritime Liguria, under the government of a count. During the contests about the crown of Italy between the German emperors and other claimants, the citizens of Genoa asserted their independence, and were governed by elective magistrates styled consuls. The names of the consuls began to be recorded from the latter part of the 11th century. At that time the Genoese had already rendered themselves formidable by sea; aided by the Pisans, they drove the Saracens out of Corsica, Capraja, and Sardinia, between 1016 and 1021. They took part in the great crusade, under Godfrey de Bouillon, and obtained settlements on the coast of Palestine, especially at Acre. In 1146 the Genoese turned their arms against the Moors, from whom, during this and the following two years, they took the island of Minorca and the Spanish cities of Almeria and Tortosa. These conquests excited the jealousy of Pisa. Four wars took place between the two states, from 1070 to 1282, in which last year the Pisans were completely defeated by sea near the rocks of Meloria, in sight of their own coast, when 3000 Pisans were killed, and 13,000 taken prisoners to Genoa.

The rivalry between Genoa and Venice began soon after the conquest of Constantinople by the Franks in 1244. The Genoese, having assisted Michael Palæologus to reconquer his capital, obtained from him the suburbs of Pera and Galata, and the port of Smyrna, with full jurisdiction over those places. They also established numerous colonies and factories on the coast of the Black Sea. The Venetians disputed with them the supremacy of the Levant seas, but after several naval fights the two powers concluded a truce in 1271. After the fall of Pisa the Genoese renewed the conflict with Venice. It lasted with varying success till 1381, when the Genoese, having taken Chioggia and besieged Venice, were themselves, by the efforts of Vettor Pisani and Carlo Zeno, blockaded in Chioggia, and forced to surrender. From that time Venice and Genoa remained at peace, with trifling interruptions. Genoa was exhausted by internal factions. To the rule of the consuls had succeeded, about A.D. 1190, that of the Podestà, renewed annually, and who were chosen from among the citizens of another state. This lasted with some interruption till 1270, when two citizens, Oberto Spinola and Oberto Dona, distinguished for their services, usurped the supreme power, under the name of 'captains of liberty,' which they retained till 1291. In the early part of the 14th century, the Guelph and Ghibeline factions continued to desolate the country. In 1339 the citizens, weary of discord and disorder, instituted a supreme magistrate, called Doge, for life, excluding by law all the nobles from the office. This lasted two centuries, but not without frequent contentions. The neighbours of Genoa, the Visconti of Milan and the kings of France, taking advantage of these feuds, at various times obtained possession of Genoa. At last, Andrea Doria had the merit of delivering his country from the French yoke; and, in order to avoid a recurrence of the former feuds, he changed the institutions of the country, by establishing biennial Doges, and councils to assist and control them. [Doria.] This aristocracy however was not wholly closed and exclusive, like that of Venice: new families might be added to it at certain times and with certain qualifications. This form of government lasted from 1528 till Bonaparte's invasion of Italy. Under the influence of France, indeed by her command, a democratic constitution was formed, protected by a strong French garrison within the town. In 1799 the French, under Massena, were besieged within Genoa by the Austrians and the English, and after a most gallant defence the town capitulated to the Austrians, but was again given up to the French after the battle of Marengo. Bonaparte, then consul, gave a new form of government to Genoa; but, when he became emperor, he required, in 1805, its formal annexation to France, to which requisition the Doge Durazzo gave his official consent, and expressed the wish of the people 'to be united to the Great Empire.' In 1814 Genoa surrendered to the English forces under Lord William Bentinck, and in the following year, by a decision of the Congress of Vienna, it was united to the Sardinian monarchy, under which it yet remains.

(Foglietta, Caffaro, and other old Genoese chroniclers; Botta, *Storia d'Italia;* Serra, *Istoria dei Liguri e dei Genovesi.*)

GENOVE'SI, ANTO'NIO, born near Salerno in 1712, was ordained priest in 1736, and was made professor of eloquence in the clerical seminary of Salerno. In 1741 he opened a class of metaphysics in the university of Naples, and there wrote his 'Elements of Metaphysics,' in Latin, which he afterwards recast into two Italian works, 'Logica per i Giovanetti,' and

'Delle Scienze Metafisiche,' which had great success, and are still much esteemed. In 1754 Bartolommeo Intieri, a wealthy Florentine merchant, founded at Naples the first chair of political economy established in Europe; and Genovesi was chosen to fill it. He then wrote his 'Lezioni di Commercio, o di Economia Civile,' 2 vols. 8vo., a book full of sound principles, and which excited a prodigious sensation among the Neapolitans, and made political economy a fashionable study.

When in 1767 the Jesuits were exiled from the kingdom, Genovesi drew up for the minister a new plan for the organisation of the schools and colleges of the kingdom. He died in September 1769. A selection of Genovesi's familiar letters was published after his death.

GENSERIC, king of the Vandals, was the bastard brother of Gonderic, whom he succeeded, A.D. 429. In the same year he left Spain, and crossed over into Africa at the solicitation of Bonifacius, the Roman governor of that province, who had been induced, by the arts of his rival Aetius, to rebel against Valentinian III., emperor of the West. Bonifacius soon repented of the step he had taken; but his repentance came too late. The Moors joined Genseric, and the sect of the Donatists, who had been persecuted by the Catholics, assisted him against their oppressors. Bonifacius was obliged to retire into Hippo Regius (the modern Bona), which however he abandoned to the barbarians, and sailed to Italy. A peace was concluded A.D. 435 between Genseric and the Emperor of the West, by which all Africa to the west of Carthage was ceded to the Vandals. Notwithstanding the peace, the city of Carthage was taken by the Vandals by surprise A.D. 439.

Genseric with a powerful fleet now ravaged the shores of Sicily and Italy. Invited by the Empress Eudoxia, he sailed up the Tiber (A.D. 455), and permitted his soldiers, for the space of 14 days, to pillage Rome. In A.D. 460 he destroyed the fleet which the Emperor Majorian had collected for the invasion of Africa. Sardinia was conquered, and Spain, Italy, Sicily, Greece, Egypt, and Asia Minor were plundered every year by the Vandal pirates. Leon, the emperor of Constantinople, at last sent a large army for the recovery of Africa, and the command was given to Basilicus. He landed at Bona, and at first met with considerable success, but was at length obliged to retire from the province. Genseric remained undisturbed master of the sea till his death, which happened A.D. 477. Genseric was an Arian, and persecuted the Catholics.

(Procopius *De Bell. Vandal.*; Gibbon's *Decline and Fall*, c. xxxiii.–xxxvi.)

GENTIA'NA, a genus of herbaceous plants, giving their name to the natural order *Gentianaceæ*, remarkable, as ornamental objects, for the brilliant colours and beautiful forms of their flowers, and most useful in medicine, on account of the pure intense bitter which they all contain. The species are extremely numerous, inhabiting the temperate parts of Europe, Asia, and America, chiefly in mountainous situations, where they breathe a pure and rarified air, are exposed to bright light during the short summers of such regions, and, though fixed during winter in places intensely cold, yet are so well prepared to resist it by the warmth of their summer, and so much protected by the snow that covers them, as to suffer no injury. These alpine plants are consequently difficult to cultivate, or even uncultivable, from the impossibility of imitating their natural atmosphere; and hence it is only a very small number that are ever seen in gardens.

The ornamental species that are found suitable for cultivation are *G. lutea*, with yellow flowers, and *G. asclepiadea, saponaria, cruciata, septemfida, acaulis*, and *pneumonanthe*, with blue flowers. Of these all require a good American border of peat-earth to grow in, with the exception of *G. acaulis*, which prefers the hardest and stiffest clay. For medical purposes, the root of *Gentiana lutea* is principally collected.

Gentiana lutea is a perennial species, common in the mountainous and sub-alpine districts of Switzerland, Germany, &c. Though the whole plant is bitter, yet, as this property is most concentrated in the root, that part only is officinal. This should be taken up in autumn, and is best when the plant is only one year old. It is generally cylindrical, often an inch thick at the summit, but below rather branched, of a dark or brown colour externally; internally fleshy and yellow. In commerce it is met with in pieces, cut longitudinally, from half a foot to a foot in length. A transverse section displays three distinct circles. The greater portion is procured from Germany; the specimens from Switzerland are generally thicker and darker coloured. When fresh it has some smell, which is almost entirely lost by drying. The taste is at first somewhat sweet, then purely and strongly bitter.

Yellow Gentian-Root is often confounded with the roots of other species of this genus, a circumstance attended with no bad consequences, but unfortunately roots of very poisonous plants, growing in the same locality, are often taken up instead of the proper one; these are, the *Veratrum album* (White Hellebore), and the *Atropa Belladonna* (Deadly Nightshade). The roots of *Aconitum lycoctonum* and *Ranunculus thora* are occasionally confounded with Gentian-Root. Gentian-Root is a pure and excellent bitter tonic, useful in all cases of debility, whether of the stomach only, or of the system generally. It possesses facilities, from not being decomposed, of being administered with many metallic salts. It yields its properties to water particularly when warm, to alcohol, and to wine.

GENTIANA'CEÆ, an extensive order of monopetalous Exogens, consisting of herbaceous plants. The flowers of these plants are usually coloured with pure bright yellow, red, or blue, and in many cases they are on this account among the most beautiful of flowers. This order is famous for its bitterness, which seems to pervade all the species. *Gentiana* itself furnishes all the officinal kinds; but *Erythræa centaurium*, a beautiful wild-flower, common in many parts of England, is advantageously employed by country people as a substitute; and the root of *Frazera Walteri* has been used as a means of adulterating the bitter Calumbo Root.

GENTILLY. [SEINE.]

GENTLEMAN, a corruption of *gentil-homme*. Some form of this word (a compound of *gentilis* and *homo*) is found in all the Romance languages (*gentil-homme* in French, *gentil-uomo* in Italian, and *gentil-hombre* in Spanish), and it is undoubtedly one of the many traces of the influence which the polity of Rome has exercised upon modern civilisation.

In the earliest form of the Roman constitution the populus, or ruling portion of the community, was divided into gentes, which were united by a common name and by the performance of certain sacred rights. Each gens was again subdivided into several familiæ, distinguished by a surname in addition to the common gentile appellation. Thus the gens Cornelia comprised the families of the Scipiones, the Lentuli, the Sullæ, &c.

Gentiles, according to Cicero ('Top.' 6), denote those who had the same name, whose ancestors had always been free, who were not capite diminuti, or had lost none of their civil rights. Hence also, in an opposite sense, '*sine gente*' is employed by Horace ('Sat.' ii. v. 15) and Suetonius ('Tib.' 1) for ignobly born and of servile parentage.

The privilege of succession, which was called *jus gentilitatis*, or simply *gentilitas* (Cic. 'De Oratore,' i. 38), and formed one of the enactments of the Twelve Tables, was gradually undermined by the encroachments of the prætors on the civil law, and finally disappeared (Gaius, iii. 25); but the name of gentle (gentile) man has survived in all the languages of Western Europe which are derived from the Latin or have received large additions from it.

According to Selden ('Titles of Honour,' p. 852), 'a gentleman is one that either, from the blood of his ancestors, or the favour of his soveraigne, or of those that have the vertue of soveraignte in them, or from his own vertue, employment, or otherwise, according to the customes of honour in his countrie, is ennobled, made gentile, or so raised to an eminencie above the multitude, that by those lawes and customes he be truly nobilis, or noble, whether he have any title, or not, fixed besides on him.'

In a narrower sense a gentleman is generally defined to be 'one who, without any title, bears a coat of arms, or whose ancestors have been freemen; and, by the coat that a gentleman giveth, he is known to be, or not, descended from those of his name that lived many hundred years since.' (Jacobs' 'Law Dictionary.') There is also said to be a gentleman by office and in reputation, as well as those that are born such (2 'Inst.' 668); and according to Blackstone, quoting Sir Thomas Smith (1 'Comm.' p. 406), 'Whosoever studieth the laws of the realm, who studieth in the universities, who professeth the liberal sciences, and (to be short) who can live idly and without manual labour, and will bear the port, charge, and countenance of a gentleman, he shall be called master, and taken for a gentleman.'

GENTOOS, or HINDOOS. [HINDUSTAN.]

GENUS signifies a multitude of objects which possess some common quality or qualities: in logic it denotes the material part of the definition.

Every object, which we call one or a unity, has a great variety of characters and qualities; and in several objects we observe many points of agreement and difference. We are enabled to consider these mutual relations and resemblances without any regard to their differences: we, as it were, draw the one away from the other; we abstract them.

Now by abstraction we may either confine our view to a quality inherent in some object independently of that object, or else, neglecting the many points of disagreement which exist between a number of objects, we may seize upon the qualities that belong to all in common, in order to combine them into a single idea. In the former case the notion is simply abstract; in the latter it is abstract and general; and the multitude of objects to which we apply the general notion or common term constitutes a *Genus*.

We may proceed in this way to neglect in succession a greater number of differences, and to comprise under the common denomination fewer points of agreement and resemblance. In this manner we form a series of notions or genera of higher and lower order, until we ultimately arrive at the highest possible—that of *being*. In this co-ordination of genera, every intermediate genus is called a subaltern genus or species, being such in respect of different other terms; for that of which a higher genus is predicated is called a species, while relatively to all other species it is itself a genus. Lastly, that which is not contained under any higher is called the *summum genus*, and that under which individuals only are comprised is usually called the *infima species*.

These general notions and genera are the principles of classification and arrangement, and without them the knowledge of facts would be a confused mass of conceptions and objects without order or coherence. But, while we admit the utility of such general notions, we must remember that they are purely relative to human science and its objects; that even as such they are imperfect, and very far from conveying an adequate expression of the truth of nature, wherein there is nothing really corresponding to them, but only a something in the individual objects from which we derive them, which not only is the cause and the occasion of our forming them, but also of transferring to them, as it were, a part of its own verity and existence, and thus justifies us in according to them our confidence in science and action.

GEOCENTRIC (having the earth as centre), a term applied to the place of a planet, as seen from the centre of the earth, in opposition to its *heliocentric* place, as seen from the centre of the sun. [PARALLAX.]

GEODESY. [TRIGONOMETRICAL SURVEY.]

GEOFFRÆA INERMIS, or *Andira inermis*, is a tree inhabiting the tropical parts of America, and yielding a bark, with emetic, drastic, purgative, and narcotic properties, and in large doses poisonous. It acts as a powerful anthelmintic.

GEOFFREY OF MONMOUTH, otherwise named ARTHUR, the well-known British historian, was born in the town from which he took his name, and is supposed to have received his

education at the Benedictine monastery in its vicinity. He was made archdeacon of Monmouth, and on the 24th February, 1152, consecrated bishop of St. Asaph. Robert, earl of Gloucester, natural son of Henry I., and Alexander, bishop of Lincoln, were his chief patrons.

Walter Mapes, at that time archdeacon of Oxford, a diligent inquirer for his day after the works of ancient authors, is said, whilst journeying in Armorica, to have met with a history of Britain written in the British tongue, the translation of which, upon his return to England, he recommended to Geoffrey of Monmouth, who undertook the task and completed it with great fidelity. He afterwards added the book of Merlin's 'Prophecies,' which he had also translated from British verse into Latin prose. Notwithstanding its fabulous and trifling stories, Archbishop Usher, Leland, and others consider that parts of the history are true. The best Welsh critics seem to consider that Geoffrey's work was a vitiated translation of the 'History of the British Kings,' written by Tyssilio or St. Talian, bishop of St. Asaph, who lived in the 7th century. A translation of it into English, by Aaron Thompson, of Queen's College, Oxford, was published in London, 1718, in 8vo. Geoffrey of Monmouth died about the year 1154.

GEOGRAPHY is a science the general object of which is to describe the surface of our globe. Its more special object is to ascertain and describe such physical peculiarities in each country as tend to promote or retard the increase of population and the arts of civilised life.

Herodotus, the father of history, is likewise the father of geography. His geographical descriptions are short and general, but always clear, and sufficient to show how far the physical peculiarities of each country influenced the changes and events which he had undertaken to commemorate. Eratosthenes availed himself of astronomical means for determining the position of places on the earth's surface. After the writings of Polybius and the travels of Posidonius, Strabo, a native of Asia Minor, who wrote in the time of Augustus and Tiberius, undertook to incorporate in one work those scattered materials, and to add the information which he had acquired in his own travels. The work so produced is one of the most valuable books left to us by the ancients. Whilst the geography of Strabo was extensively used all over the Roman world, the astronomical school of Alexandria continued collecting materials for the purpose of completing and perfecting the system of geography framed by Eratosthenes. These collections enabled Ptolemæus to form his geography, which is hardly anything more than a catalogue of places according to their estimated or determined geographical position.

The downfal of the Roman Empire suddenly extinguished all scientific research. Geography, which shared the fate of the other sciences, was however revived sooner than the rest, and the circumstance which led to this was the travels of the Venetian, Marco Polo. These travels were full of curious details; but they gave rise to very erroneous notions concerning the position and longitudes of places in Asia. After the discovery of America by Columbus, at the end of the 15th century, geographers were employed in discovering the extensive coasts of that continent, and the countries and islands lying along it, and in inserting these new discoveries in their maps according to such determinations of positions as they could obtain. The spread of knowledge gave birth to the labours of the historical geographers of the 17th century, such as Chardin, Shaw, Pococke, and Chandler; men who combined a knowledge of antiquity and history with the requisite qualities of travellers. These travels greatly contributed to the improvement of geography as a science. They brought history and geography again into close connection. Still the science of geography remained in a very imperfect state. It had never been a subject of investigation, how far the physical character of a country was favourable or adverse to the civilisation of its inhabitants. This has now in a great degree been effected by the naturalists and other men of science who, during the last and the present century, have visited nearly every part on the globe.

Geography, then, in its present state, and in its practical application, has for its object the determination of all those facts, as to any given country which will enable us to judge of its fitness to provide man with food and to promote his civilisation. The soil and climate; the elevation of the surface; the distribution into mountains, valleys and plains; the existence of swamps and bogs; the lengths and courses of the rivers; the lakes and inland seas; the temperature and moisture of air, the direction and general character of the winds, the fitness of the soil for grazing, for food-plants and for clothing-plants; the elements fitted to form an export trade; the botany and zoology, so far as they relate to industrial pursuits; the mineral wealth, as viewed in a similar way—all these are matters which come legitimately under the domain of Geography.

It becomes a question how far Statistics, Natural History, and History, ought to be included in geographical works. Statistical facts, for the most part, are of such a description that they are true only for a very short time, and then lose that character. Such things, according to the opinion of Strabo, ought not to be received among things which are of an entirely different nature. Yet the knowledge of a country would be properly considered as incomplete without a general notion of the most commercial and manufacturing towns within it. Such towns must therefore be mentioned, and at the same time it should be stated how far they facilitate the internal and external intercourse of a country. Anything beyond this comes within the sphere of Topography rather than Geography. In respect to Natural History, such phenomena as volcanoes, earthquakes, and mineral springs, which exercise an influence on the habitableness of a country, ought to be noticed in connection with its geography. With regard to antiquarian and historical monuments and ruins they may be regarded as specialties, and, if they belong to geography at all, do not belong to it as necessary component parts of it, but stand to it

such a relation as to admit of being introduced or omitted according to the taste and judgment of the writer. The political institutions of a country belong to its history, and not to its geography, and ought certainly to be excluded from geographical treatises, though they form a necessary part of most statistical and of all historical works.

The importance which geography as a science has attained of late years has suggested the formation of Geographical Societies. The main object of such societies is, or ought to be, to encourage the accumulation of facts as to countries that are little known. The first Geographical Society was established at Paris in 1821. The second society of this kind was established at London, in 1830, and called the Royal Geographical Society. This society publishes annually a volume of transactions, under the title of the 'Journal of the Royal Geographical Society.' We think it may be safely asserted that there has seldom appeared a work which, for amount of original information, can be compared with these Transactions. Besides the narratives voluntarily contributed by distinguished travellers, and analyses of new geographical works, in various languages, these Transactions contain the records of expeditions sent out by the Society itself; such as those of Alexander, Schomburgk, Ainsworth, &c.

The success of the British Society led to the formation of a similar society at Berlin (1833), and at Frankfort-on-the-Main (1837). A Geographical Society has also been formed at Bombay, which has for its object 'the elucidation of the geography of Western India and the surrounding countries.'

GEOLOGY (from the Greek γῆ, earth, and λόγος, a discourse) includes, in a large sense, all acquired or possible knowledge of the natural phenomena on and within the globe. Some of these phenomena are witnessed in connection with inorganic bodies, and depend in a great degree on the laws of force which appertain to and distinguish from each other the particles of matter; others are exemplified in organised structures endowed with vital functions related to those structures; and there may yet be distinguished a third order of effects influencing and combining with both of the former, and depending on laws of force which affect the whole mass of the globe, as gravitation, or derived from extraneous agency, as light.

History.—Among the ancients the notices of geology are few. Scattered thoughts are to be met with in Herodotus (ii. 11), Ovid ('Metam.' xv. 293), Aristotle ('Meteorologica'), and Strabo (ed. Casaub. 49, &c.), bearing on this subject, but nothing approaching to a regular geological system. Fifteen centuries elapsed after the time of Strabo without producing any geological work of value except a few details by Omar, an Arabian writer.

Italy, the fruitful mother of modern physical science, offered in her volcanic cones, ranges of mountains, and shelly marls at their bases, the most attractive points to the intellectual activity of the precursors and contemporaries of Galileo. Fracastoro and Georgius Agricola in the 16th century, and Cardano, Colonna, and Scilla, in the 17th centuries, carried on discussions concerning the origin of certain rocks, and of fossils found therein; and these discussions were taken up in other countries by Steno, Plot, Wotton, Lister, Ray, Woodward, Scheuchzer, and Palissy. But, as soon as the arguments employed made the smallest approach to an apparent disagreement with the Mosaic account of the Deluge, the science was shunned and scouted in many influential quarters; and the writings of Quirini, Hooke, Ramazzini, Leibnitz, Ray, Moro, Buffon, Linnæus, Whitehurst, and other observers, in the 17th and 18th centuries, could scarcely bear up against the prejudices thus excited.

The discovery of fossils in dry and elevated situations was the great point of discussion. There can be but these two hypotheses concerning it—either the shelly bed of the sea has been raised, or the ocean has abandoned its ancient place. Ray, Hooke, and many Italian geologists, adopted the former view; while Woodward, Burnet, and Whiston, adopted the diluvial hypothesis. These latter agreed in adopting the notion of an interior abyss below the crust of the earth, as the general reservoir from whence the waters rushed to cover the earth, and into which they again withdrew after the diluvial devastation was completed. Whiston, who was far better versed in physical science than either of the others, introduced in addition the notion of extraneous force; he brought a comet to envelope the earth in its misty tail, to cause violent rains, raise vast tides in the internal abyss, and thus effectually destroy the external crust of the planet. Vallisneri, in 1721, supposed the ocean to have once extended over all the earth, and to have gradually subsided, leaving everywhere the traces, not of a violent flood, but of the quiet super-fluctuation of water. Leibnitz, in 1680, had started a theory from a very different point of view. He commences with the concentration of the mass of the globe in a state of great heat, accounts for the fundamental primary rocks by the refrigeration of the surface, and explains the violent action of water upon them by the collapse of this crust on the contracting nucleus. Sedimentary strata are the natural consequence of these watery movements subsiding to rest, and by the repetition of the phenomena such features are imparted to the earth as to insulate many of the later deposits. Ray and Hooke supposed the essential condition of the world to be one of continual change, and assign to modern causes in action a measure of force capable of producing, in a sufficient lapse of time, phenomena as important as those of ancient geological date. Dr. James Hutton, of Edinburgh, rejected all inquiry as to the beginning of the world, and gave himself up entirely to an explanation of the phenomena visible in the crust of the earth, on the principle of a continual degradation of land by atmospheric agency, the consequent formation of sedimentary strata on the bed of the sea, and the periodical compensation of these effects by the action of internal heat raising the bed of the sea, with the stratified deposits thereon.

Very little was done till the present century in studying geology inductively, that is, by reasoning from facts instead of from hypotheses. Among the few who did so was Lehman, who in 1756

proposed an intelligible classification of rocks into three groups, according to their properties; Pallas, who in 1779 drew attention to the difference between primary and secondary rocks; Werner, who in 1796 propounded the doctrine of formations universally succeeding each other in a settled order of time; Whitehurst, who somewhat earlier gave a very distinct account of the stratification of Derbyshire; and a few other writers.

But it is Mr. William Smith who is regarded as the father of modern geology. Commencing his career as a surveyor of land, and afterwards acquiring great employment as a civil engineer, his attention was drawn in 1787 to the obvious distinctions in the soils and the subjacent strata of certain parts of Oxfordshire and Warwickshire, which occupied, with regard to one another, a certain geographical relation. In 1790 and 1791 the same relative position of the same strata was forced on his attention in Somersetshire, with the addition of a series of coal strata below the oolite, lias, and red marls, with which he was previously familiar. Following out this clue, he found that one general order of succession of the strata could be traced throughout the island, with a general dip to the east or south-east. The result was a geological map of England and Wales, drawn previous to 1801, when proposals were issued for the publication of it. In subsequent examinations he ascertained the important fact, that fossils were definitely located in the rocks; each stratum had its own peculiar species, wherever it occurred, and could thus be identified when in detached masses and in distant localities. Although a few researches had been made by other inquirers concerning fossils, it is unquestionably to Smith that we owe the important doctrine, that, during the formation of the stratified crust of the earth, the races of animals and plants were often and completely changed, so that each stratified rock became, in his eyes, the museum of that age of the world, containing a peculiar suite of organic exuviæ, the remains of the creatures then in existence. The groundwork being thus laid, fossil geology soon became an important study in the hands of Cuvier, Brongniart, Deshayes, Lyell, and many other inquirers, who made it a particular branch of their study to determine how far fossil species correspond with or differ from existing species.

The geologists of all countries have agreed that the best record of their labours will be well-executed maps and sections of the countries examined, showing the nature, and area, and thickness of the several strata; and such maps, commenced by Smith, have been since carried on by Greenough, Lyell, Griffith, Macculloch, De la Beche, Murchison, Von Buch, and other able geologists.

Matter of the Globe.—A certain combination of chemistry and of astronomy is necessary to any large conception respecting the early history of the earth as a planet. Chemistry, by analysis of the different sorts of matter visible near the surface of the earth, teaches us that almost every thing is of a compound nature, and formed by the union of two or more elementary particles, endowed with distinguishable properties, and capable of a separate existence and of entering into new combinations. It is also known that most of these bodies are capable of assuming the forms of solid, liquid, and gaseous, according to the degree of heat brought to bear on them. Hence arises the speculation whether the materials of the earth may at any time have been so highly heated as to have assumed the gaseous form; and the astronomer is then appealed to to determine whether any masses of matter exist which are of the nature of the gaseous expansion assumed; and, if this be the case, whether there be gradations in the appearances which they present such as to justify the belief in the possibility of a gradual conversion of a planet into an expansion, or the contrary. To these inquiries the far-seeing eyes of the elder Herschel seemed to supply an answer, in his grand conception of the nebular theory, the consideration of which belongs to astronomy rather than to geology; and there was a very general opinion that the mass of the earth once existed as a part of a diffused nebula, like some now visible in the heavens. Whether the consolidation of such a nebula could be brought about by the agency of causes now in operation, differing from them only in intensity, is one of the most interesting speculations in modern geology.

Heat of the Globe.—The temperature of the globe is an important element in the history of the changes which the earth has undergone. For each point of the earth's surface there is a certain mean temperature, depending on external or astronomical causes; but at greater depths, and in situations where the external influence of the air, and the artificial effects of light, respiration, &c., could be guarded against or justly appreciated, observations agree in proving that a continual augmentation of temperature constantly occurs. It is hence concluded that the interior masses of the globe are incomparably hotter than the parts at the surface; must formerly have been still hotter; and, though now the interior heat is almost wholly masked and stifled by the non-conducting stratified masses which form the crust of the earth, it must formerly have influenced in a decided manner the temperature, and with it all other phenomena at the surface of the earth.

That the internal heat was once greater than it now is, is borne out by many facts. The deepest rocks are such as seem evidently to have been cooled from igneous fusion; and the figure of the earth is such as would result from revolution on its axis, provided the whole or a very large part of the mass were in a state of fluidity or viscidity. Whether the earth be now solid or fluid at the centre is a curious subject of speculation. Mr. Hopkins, from a combined view of radiation and pressure, such as the earth must have undergone, shows that from an originally fluid mass two solid masses would be produced and continually augmented—a spherical nucleus, and a spherical shell—while between them would remain a large but diminishing zone of viscous matter, subject to some changes of temperature through the conversion of its surfaces from a liquid to a solid state. This is under certain assumed ratios between the

radiation and the pressure; but it is not yet known how far these ratios agree with the real conditions of the earth.

Modern Causes of Change. — Besides the changes resulting from the gradual cooling of the mass of the earth, there are many other forces now in action tending to produce changes in the external crust of the earth. The varying heat received from the sun, according to the position of the earth in its annual and diurnal revolutions; the effect of light in modifying the animal and vegetable world; the disintegrating effect of seas, rivers, springs, and rain; the chemical and mechanical action of the atmosphere; the disruptive forces of volcanoes and earthquakes; the sediments transported by rivers; the formations due wholly to the labours of innumerable marine animals—all tend to produce incessant change on the earth's surface. These changes affect the geographical boundaries of land and water, the relative levels of land and sea, and the forms, proportions, and distribution of animal and vegetable life.

So far as the mechanical agency of water is concerned, there is a constant tendency in the ocean to increase in surface, but to decrease in depth; but volcanic agency leads to a directly opposite result. It is however a matter admitting of doubt whether even the quantity of water on the globe is constant; for so many combinations of earthy substances require certain proportions of water for their completion, and so much of volcanic excitement appears due to the decomposition of water, that it would perhaps be safer to suppose the water continually diminishing in quantity; nor is it at all unlikely that such may be the case with the atmosphere.

The statement of the effects of modern causes must necessarily be received as true and applicable to other æras of the world, at least in its general features. But it does not follow that they must always have been equal in degree of action. Many sudden changes have evidently occurred, arising from the unusual predominance of some of the above forces. If we compare the present with the past, as exhibited by geological formations, it becomes undeniable that the earth has undergone many very extensive revolutions in all that respects its aqueous, igneous, and organic phenomena, before arriving at its present state: it is equally certain that, between the epochs of these revolutions, the state of the earth was not extremely dissimilar to that which we now behold; yet, because the organic beings preserved in the earth in each of these systems are peculiar to it, and differ from the others and from those that now live, we cannot possibly doubt that the points of difference were numerous, general, and important.

Successive Periods of Formation.—At a certain depth below the surface of the earth the rocks are massive, without stratification, and without fossils, affording evidence of having been acted on by fire; but above these rocks are others which, by being stratified, and by having fossils peculiar to themselves, may be classified and arranged. They represent, too, epochs of time, in respect to their period of formation, although we cannot measure the time by years or centuries. To form an exact list of existing strata in each country is one great part of the geologist's labours; and until this is completed the relation between the igneous and aqueous rocks must be but imperfectly known.

The following is a Table of British Strata, taken from Phillips's 'Guide to Geology.' The nomenclature of geology is undergoing gradual changes; but these we need not touch upon at present. The strata begin from the surface, from which all water-moved gravel and river sediment are supposed to be removed. The marine strata are marked by *figures;* the fresh-water strata by *letters;* and the names of a few fossils, characteristic of the strata, are printed in italics. The general thickness, in round numbers, is represented in yards :—

Tertiary Strata.

(A few of the fossils identical with existing species.)

	Formation.	*Yards.*	*Fossils.*
1.	Clay	16	40 per cent. of shells of existing species.
a.	Fresh-water Marls .	33	Æstuary shells.
2.	London clay	100 to 200	Marine shells.
	Plastic clay	100 to 400	„ „

Secondary Strata.

(Fossils differ from the above, and are all of extinct species.)

Cretaceous System.	3. Chalk . .	200	*Zoophyta, Echinodermata.*
	4. Green-sand .	160	*Belemnites minimus.*
Oolitic System.	*b.* Wealden . .	300	*Cyprides, Iguanodon.*
	5. Portland oolite	130	*Ostrea deltoidea.*
	6. Oxford oolite .	150	*Echinida, Ammonites, Pinna.*
	7. Bath oolite .	130	*Avicula, Trigonia, Megalosaurus.*
	8. Lias . . .	350	*Saurians,* very numerous shells.
New Red Sandstone System.	9. New red sandstone . .	300	Very few fossils.
	10. Magnesian limestone . .	100	A few corals, shells, and fishes.
Carboniferous System.	*c.* Coal . . .	1000	Æstuary shells, and land-plants.
	11. Carboniferous or mountain limestone .	800	*Crinoidea, Spiriferæ, Orthoceratа,* &c.
	12. Old red sandstone	100 to 3300	A few fossil fishes.

Primary Strata.

(All the fossils belong to extinct species.)

	Formations.	Yards.	Fossils.
Silurian System.	13. Ludlow rocks	660	*Orbicula, Lingula, Terebratula.*
	14. Wenlock limestone . .	600	Corals and shells in vast abundance.
	15. Caradoc sandstone . .	830	*Pentamerus, Orthis, Trilobites.*
	16. Landeilo rocks	400	*Asaphus Buchii*, and other *Trilobites.*
	17. Plynlymmon rocks . .		*Orbicula, Zoophyta.*
Cambrian System.	18. Bala limestone		*Orbicula, Zoophyta.*
	19. Snowdon rocks		A few fossils.
Uncertain.	Clay slate . . .		No fossils known.
Skiddaw System.	Chiastolite slate . Hornblende slate		No fossils known.
	Mica-schist system		No organic remains.
	Gneiss system .		No organic remains.

The relation which these several strata bear to each other may be thus briefly noticed.

Primary Strata.—Gneiss and mica-schist are composed chiefly of the same materials as granite, viz. felspar, quartz, and mica; and it is supposed that they have been formed by aqueous agency from disintegrated granite, which is an igneous rock. They are wholly destitute of indications of organised life, and furnish no proof of the contemporaneous or previous existence of dry land. As a general inference, it appears that the circumstances which accompanied the accumulation of these rocks were greatly different from what we now behold, since nowhere on the sea-shores are any such products found, nor can we suppose anything analogous producible in the bed of the sea, unless where some peculiar agitation of water may hasten the disintegration of granite. It seems probable that the proper internal heat of the earth was then only just so much reduced as to allow of a peculiar watery action upon its cooling crystallised masses, but not enough diminished to allow of the conditions within which the existence of organic beings is restricted on the earth.

The Skiddaw, Cambrian, and Silurian systems bear some such relation to gneiss and mica-schist as common clay bears to common sand. They have usually a fine-grained texture, a laminated structure, and a blueish or grayish colour. The proofs which these formations offer of the existence of dry land are chiefly (or wholly) derived from the organic remains of plants, which are not certainly known among the lower groups, but become tolerably plentiful in the upper parts of the systems. The alterations which the rocks have undergone by the action of heat are general, sufficient in most countries to superinduce new structures (slaty cleavage), but not to destroy the traces of organic remains.

Above the uppermost primary strata are some which have sometimes been called *transition*, as having a medium character between primary and secondary. Before the close of the primary period, limited tracts of dry land had appeared above the waters, so as to nourish certain plants; while the sea became quite fit for the residence of marine zoophyta, the constructors of reefs and islands. After the deposition of the primary strata, there seem to have been mighty convulsions, which broke up and distorted the crust of the earth, and formed secondary deposits out of the shattered fragments of the primary. Such convulsions were most probably due to igneous or volcanic agency from within; and the effects which followed the change were, the introduction of a new order of sedimentary deposits, with new geographical relations, the extinction of old and the creation of new groups of organic beings, and the commencement of a new act (so to speak) in the great history of the earth.

Secondary Strata.—On the undulated bed of the sea, round the ranges of primary rocks raised in insulated tracts by great convulsion, secondary strata were formed; sometimes derived from the waste of the primary strata, through the influence of atmospheric agency or the wearing of the sea on its shores; sometimes due to marine formation; and sometimes formed by volcanic ashes and scoriæ. These secondary strata may be easily grouped into systems; and it is found that to each of these systems belong littoral, marine, and oceanic deposits; sandstones having been chiefly collected amid the agitation of the shores, clays accumulated in quiet bays or gulfs, and limestones aggregated in deeper water. Each system, too, is marked by its own peculiar species of fossil plants and animals.

The coal seams of the great carboniferous system are believed to have resulted from the decay of immense masses of vegetation. How such masses could have accumulated is a matter difficult to understand. As carbonic acid existing in the atmosphere is the source of the carbonaceous substance of plants, M. Adolphe Brongniart proposes the speculation that it was a great abundance of this ingredient of the atmosphere which favoured vegetation in the carboniferous æra; and he finds support to his view in the fact that during this same period there is very little trace of the existence of any land animal whatsoever. Whether this be the case or not, it seems pretty certain that the numerous earthy beds which form parts of this system (excepting perhaps part of the old red sandstone series) are derived from wasted lands or sea-coasts, or from a decomposition of the sea-water by vital or chemical agency. The period during which the carboniferous system was being deposited seems to have been one of much quietness and orderly progress; but, after the formation of the strata was ended in Europe and America, the long tranquillity of the ocean in these parts was broken by extensive and vio-

lent concussion, so that hardly a single square mile of country can anywhere be found which is not full of fractured and contorted strata, in consequence of subterranean movements which mostly preceded the accumulation of the next system of strata. There seem also to have been new ridges and islands formed at this period by violent upheavings from beneath.

Instead of the great quantity of vegetable matter buried in the coal tracts, we have in the principal part of the red sandstones only a few insignificant traces; so few in England that scattered fragments are valued in geological reasoning: neither are the marine reliquiæ of the magnesian limestones in the midst of the red rocks at all plentiful, except in a few spots. In the magnesian limestones of this system expire many of the forms of the older carboniferous period, and at higher levels we find a strong resemblance of the marine zoophyta shells and crustacea to those of the younger oolitic system. Upon the whole, there seems reason to think that the new red sandstone system could not have occupied a long time in its formation, compared with other deposits of equal thickness.

Into the same European and Asiatic basins which received the red clays, red sands, and magnesian limestones, of the last system, subsequent agencies brought blue clays, sands more or less ochraceous, and limestones characterised by an oolitic texture. New and more abundant forms of plants, with many varieties of zoophyta, mollusca, crustacea, fishes, and gigantic reptiles of the land, rivers, and the sea, mark the oolitic rocks, and render them justly comparable as a system with the great carboniferous assemblage of strata. The state of the earth during the oolitic period is supposed to have resembled in many points, as to climate, fertility, &c., that of the south-eastern part of Australia at the present time.

The last portion of the series of secondary strata was deposited in the same oceanic basins as the earliest. Sands coloured green by silicate of iron, and white soft limestones with beds or nodules of flint, seem to bespeak for the cretaceous system an origin from the waste of lands different from those which discharged their sands into the oolitiferous sea, and other modes of chemical or vital action in the sea: yet a scrupulous analysis of the oolitic system shows in its upper part analogies to the cretaceous rocks so strong and so various as to render it probable, if not certain, that the new conditions characteristic of the new system were gradually or partially introduced till they entirely predominated. In several countries the cretaceous period was ended by violent eruptions and contortions.

Tertiary Strata.— In general no contrast can be more complete than that between the secondary and tertiary stratified rocks, the former retaining so much uniformity of character, even for enormous distances, as to appear like the effect of one determined sequence of general physical agencies; the latter exhibiting an almost boundless local variety, and relations to the present configuration of land and sea not to be mistaken. The organic bodies of the secondary strata are obviously and

completely distinct from those of the modern land and sea; but in the tertiary deposits it is the resemblance between fossil and recent kinds of shells, corals, plants, &c., which first arrests the judgment. In general there is a decided break between the two groups of rocks—a discontinuity which is nowhere completely filled.

With the tertiary system came into existence (if we may trust the negative evidence which the earlier strata present) many races of quadrupeds; some birds, reptiles, and fishes, extremely analogous, though for the most part specifically distinct from the modern denizens of land and water; thousands of corals, shells, crustacea, &c., which present great analogies with living races; the general features of land and sea as they now exist begin to appear; and there can be no doubt that in a philosophical study of the revolutions of the globe the tertiary æra of geology cannot be properly separated from the existing system of nature.

Present Aspect of the Globe.—Throughout all the globe the outlines of land and sea depend principally on the disposition of mountain-chains and groups, which in every instance yet known are certainly shown to have been raised by mechanical agency, generally with a degree of violence so great as to require the supposition of great and general excitement of the subterranean forces of heat. Frequently however this dependence of the form of the existing land upon the ranges of mountains is disguised by the extent of comparatively plain country which separates the mountains from the sea. In such cases it is necessary to admit that the general level of the sea has subsided, or that large tracts of land have been raised gradually, or by successive movements, around the mountains, which in earlier times were uplifted by more violent causes. It appears probable that particular regions have risen round the same points and lines which once experienced a violent upward movement.

The interior features of every country in like manner depend upon recognised geological agencies. The unequal elevation of mountain-ranges above the sea is a phenomenon which will be found of great importance in geological theory. It appears to be true, at least in Europe, that the most elevated chains of mountains are those whose elevation was not ended (if, indeed, it be yet ended) until the tertiary or later epochs. Raised in this manner by violent or gradual movements out of the sea, the dry land has since been subjected to waste by atmospheric action. There is no doubt also that to different sorts of rock belong some differences of aspect, some characteristic scenery.

Whether the valleys which appear on the surface of the earth were formed by atmospheric agency; by the action of running waters; by the subsidence of the crust of the earth; by dislocations on the line of the valley; or by the overwhelming force of a general flood;—have been subjects much discussed by various writers; but it is now believed that all these agencies may have been at work, in respect to valleys of different sizes and character. The forms of hills,

like the depth and directions of valleys, are in part dependent on the presence of strata of unequal resisting power.

The land which has made itself visible on the surface of the globe is not all of the same antiquity; some regions must have been covered by trees, perhaps traversed by quadrupeds, before the substance of others was laid on the bed of the sea. Since life was developed on the globe, if geology has rightly interpreted the monuments of nature, there has never been any considerable period during which the land or sea was wholly deprived of organic beings; but, as the condition of the globe changed, the forms of life were altered, old races perished, new creations were awakened, the sum of animal and vegetable existence was continually augmented, and the variety of their forms and habits continually multiplied, as the conditions of land and sea were diversified, until man was added to the wonders of creation, and historic time began.

The relation of living to extinct races of plants and animals is various. In point of number, the recent is perhaps 100 times as considerable as the fossil Flora. The same is true of the marine races of shells, crustacea, fishes, &c.; for both the total number of species, and the relative number to a given thickness of strata, augment from the early towards the later formations, and are greatest of all in the tertiary strata, which in character of organic life most nearly resemble the modern productions of nature. Hardly one species of the fossil kingdom is so peculiar in its structure that nothing at all like it is now in existence; and every year's researches fill up links in the general chain of connection. Each species, each genus, and often each family, of plants and animals, is especially abundant in and often exclusively confined to particular parts of the land or sea, even among those animals whose powers of locomotion are the greatest. Among fishes, birds, and swift quadrupeds, this attachment to locality is scarcely less remarkable than among plants, zoophytes, and mollusca, which have no means of diffusing their races, except what winds and currents give.

Geological Time.—There is perhaps no more difficult problem in geology than the determination of the length of time which has elapsed during the formation of the whole or any definite part of the crust of the earth. Time, as measured by generations of men, fails to carry us back to remote geological epochs; man is but a recent visitor of the globe; and, though we may know that the various strata must have been formed at very remote periods, the attempt to measure those periods is surrounded with difficulty.

The three most probable measures of geological time seem to be—the deposition of stratified rocks; the changes of organic life on the land and in the sea; and the displacements of portions of land and sea. With respect to the first, the phenomena of stratification are at this day repeated in most parts of the world, where great rivers sweep earthy materials and vegetable reliquiæ into the sea. If a deposit of given thickness be now formed in the same space of time as in former periods, a measure of time could be obtained; but it is impossible to tell how far atmospheric agency differed at the two periods, in respect to its effects on the earth; and, until this be settled, the proposed measure of time fails us.

In respect to the changes of organic life on land and sea, if we could establish from history any rate of change in organic life—any per-centage of species destroyed or created in a given series of years—some considerable steps might be laid for further advance in determining the epochs of past changes. But the evidence on this point is utterly vague and indecisive. All that we can say with safety is, that the age of the earth cannot be estimated at less than several times the whole tertiary period; that, compared with this, the historical portion of time, which dates from the birth of man, contracts to a point; and that the rate of organic development has been augmented, and the rapidity of sedimentary deposition diminished, since the primary æra.

The third proposed means, viz. the displacement of portions of land and sea, is found to be as little effectual as the other two in affording a precise measure of geological time in past periods. On the whole, it appears that the day is not arrived for theory to trust itself with the attempt to assign definite values to the symbols of duration which remain in the earth.

Economic Geology.—As geology advances, its application to productive industry becomes more and more valuable; and, in turn, the latter affords increased means of observation to geology as a science.

The great aid afforded by geology to coal-mining has been in showing where coal may or may not be reasonably looked for, according to the nature of the adjacent strata. Attempts have been made to find coal in Oxfordshire, Sussex, and Radnorshire, which would not have been made had geology been consulted. On the other hand, many of the Durham collieries were set to work expressly at the suggestion of geologists, against the opinion of the practical colliers.

The beneficial results which mining operations have derived from geology are in proportion to the degree in which the experience of miners has been reduced to the form of science. On the subject of the situation of metallic treasures, already enough is known to show that the occurrence of mineral veins is a circumstance depending on conditions which are more or less ascertainable. In opening new mining ground, such conditions are often capable of being brought into an intelligible form; and even in districts partially known or long worked many problems occur which time and combined registration of phenomena observed might easily solve. These geological problems, as to the relation between the contents of a vein and the nature of the neighbouring rock, the occurrence of certain cross-veins, the depth of the workings, &c., usually present themselves to the practical miner under the general question of the probability of the vein being productive.

In planning the lines of railways, canals, or common roads, the engineer will often be benefited by the records of geological surveys—an examina-

tion which, if they had existed in past generations, would have prevented many gross mistakes which have been made in some of our roads and canals.

In some favoured countries the labours of the sculptor and the architect are scarcely injured by exposure to the atmosphere for 2000 years; while, in our damp and changeable climate, even the interiors of cathedrals show, by the decay of the marbles and the destruction of the stone walls, the necessity for an architect to study the durability of his materials. The careful researches preparatory to the selection of stone for the new Houses of Parliament afford an example of the way in which geology may be brought to bear upon the constructive arts.

To the agriculturist geology has rendered some services, and probably may in future be appealed to for further aid. Geology is the basis of all sound knowledge of springs and the subterranean distribution of water. The rain, which falls from the heavens upon all soils and rocks indifferently, runs off the clays, but sinks into the limestones, sandstones, and other rocks, whose open joints act like so many hidden reservoirs. A knowledge of the subsequent course of these streams of water is of infinite importance to the subject of draining, to the construction of wells, and to the supply of water to towns.

For further details, see ALLUVIUM, ARTESIAN WELLS, COAL, CRETACEOUS GROUP, DILUVIUM, and other geological heads.

GEO'METER, a person who is skilled in geometry; but the term derives its meaning from the time when geometry was by very much the most important branch of mathematics, and now it generally means mathematician. For instance, the French (who make considerable use of the term) call Laplace *un géomètre*, though his writings are exclusively algebraical. The term must then be understood to signify simply mathematician.

GEOMETRICAL. Of this term as opposed to algebraical or arithmetical, nothing need be said; but the peculiar conventions of geometry oppose it most frequently to the term *mechanical*. Every construction which can be made by the ruler and compasses, that is, which demands no points except such as can be found by the intersections of straight lines and circles, is *geometrical*: every construction which requires any other curve, or which tacitly requires such a motion of a straight line or circle as would generate any other curve, is *mechanical*. The reason is, that it pleased the Greeks to use these terms as distinctive of the things which can and cannot be done by the straight line and circle only: a real and important distinction with an unfortunate name.

GEOMETRY (*γεωμετρία, geométria*, or earth-measurement), the science which investigates the relations existing between parts of space, whether linear, superficial, or solid. But, at the same time, the most common meaning of the word implies that the investigation is to take place under restrictions as to the instruments which may be employed.

As geometry is in all probability the most ancient subject to which actual demonstration was applied, we may thus account for the permanent association which has always existed between the idea of this science and that of rigorous deduction.

There is a story that the Egyptians, having their landmarks yearly destroyed by the rise of the Nile, were obliged to invent an art of land-surveying in order to preserve the memory of the bounds of property; out of which art geometry arose. This story, or rather supposition, requires at least contemporary evidence to make it history.

Among the Chinese, the Jesuit missionaries found very little knowledge of the properties of space, a few rules for mensuration and the famous property of the right-angled triangle being all that they could ascertain. The Hindoos produce a much larger body of knowledge, but of uncertain date.

Of the Babylonian and of the Egyptian geometry we have no remains whatever, though each nation has been often said to have invented the science. In the Jewish writings there is no trace of any knowledge of geometry. So that, allowing the Greeks to have received the merest rudiments either from Egypt or India, or any other country, it is impossible to name any quarter from which we can with a shadow of probability imagine them to have received a deductive system, to ever so small an extent.

Thales (600 B.C.) and Pythagoras (540 B.C.) founded the earliest schools of geometry. The latter is said to have sacrificed a hecatomb when he discovered the property of the right-angled triangle before alluded to.

According to Proclus, Pythagoras was the first who gave geometry the form of a science. Plato was the next great advancer of the science. To him succeeded various others; after whom came Euclid, 'who was not much younger than those mentioned, and who put together elements, and arranged many things of Eudoxus, and gave unanswerable demonstrations of many things which had been loosely demonstrated before him.' He lived under the first Ptolemæus, by whom he was asked for an easy method of learning geometry, to which he made the celebrated answer, that there was no royal road. He was younger than the time of Plato, and older than Eratosthenes and Archimedes. He was of the Platonic sect.

Before the time of Euclid, demonstration had been introduced, about the time, perhaps by the instrumentality, of Pythagoras; pure geometry had been restricted to the right line and circle, but by whom is not at all known; the geometrical analysis, and the study of the conic sections, as also the consideration of the problems of the duplication of the cube, the finding of two mean proportionals, and the trisection of the angle, had been cultivated by the school of Plato; the quadrature of a certain circular space had been attained, and the general problem suggested and attempted by Hippocrates and others; incommensurables had been written on; a curve of double curvature had been imagined and used by Archytas; writings existed both on the elements, and on conic sections, loci, and detached subjects.

It is not known where Euclid was born. He opened a school of mathematics at Alexandria, in the reign of Ptolemæus the son of Lagus (323–284

B.C.), from which school came Eratosthenes, Archimedes, Apollonius, Ptolemæus, the Theons, &c., &c., so that from and after Euclid the history of the school of Alexandria is that of Greek geometry. Besides the 'Elements,' Euclid wrote, or is supposed to have written, the following works:—

1. A treatise on Fallacies, preparatory to geometrical reasoning.

2. Four books of Conic Sections, but this is very doubtful.

3. On Divisions. This work is mentioned by Proclus in two words.

4. On Porisms, in three books.

5. Locorum ad Superficiem: which we cannot translate.

The preceding works are lost; those which follow all exist, and are contained in Gregory's edition, in the order inverse to that in which they are here mentioned.

6. On Optics and Catoptrics. Proceeding on the supposition that rays of light are carried *from the eye to the object*, the first of these books demonstrates some relations of apparent magnitude, and shows how to measure an unknown height by the well-known law of reflected light. In the second an imperfect theory of convex and concave mirrors is given.

7. On Astronomical Appearances. It contains a geometrical doctrine of the sphere, and, though probably much corrupted by time, is undoubtedly Euclid's.

8. The Division of the Scale and Introduction to Harmony. Proclus mentions that Euclid wrote on harmony; but the first of these treatises is a distinct geometrical refutation of the principles laid down in the second, which renders it unlikely that Euclid should have written both.

9. A Book of Data. This is considered the most valuable specimen which we have left of the rudiments of the geometrical analysis of the Greeks. Before a result can be found, it should be known whether the given hypotheses are sufficient to determine it. The application of algebra settles both points, that is, ascertains whether one or more definite results can be determined, and determines them. But in geometry it is possible to propose a question which is really indeterminate, and in a determinate form, while at the same time the methods of geometry which give one answer may not give the means of ascertaining whether the answer thus obtained is the only one.

The Data of Euclid may be looked upon as a collection of geometrical problems, in which the attention of the reader is directed more to the question of the sufficiency of the hypothesis to produce one result, and one only, than to the method of obtaining the result.

10. The Elements (of Geometry). For a long time writers hardly considered it necessary to state whose Elements they referred to, since a certain book of the elements always signified that book of Euclid; and it was customary in England to call each book an Element; thus in Billingsley's old translation the sixth book is called *the sixth Element*.

The reason why the Elements have maintained their ground is not their extreme precision in the statement of what they demand; for it frequently happens that a result is appealed to as self-evident, which is not to be found in the expressed axioms. Neither does their fame arise from their never assuming what might be proved; for in the very definitions we find it asserted that the diameter of a circle bisects the figure, which might be readily proved from the axioms. Neither is it the complete freedom from redundancy, nor the perfection of the arrangement; for book i. prop. 4, which is very much out of place, considering that it is never wanted in the first book, is, in point of fact, proved again (though not expressed) in prop. 19. Neither is it the manner in which our ideas of magnitude are rendered complete as well as definite: for instance, book iii. prop. 20, is incomplete with Euclid's definition and use of the term angle; nor with that term as used by him can the 21st proposition of that book be fully demonstrated without the help of the subsequent 22nd. In fact, the Elements abound in defects, which, if we may so speak, are clearly seen by the light of their excellencies: the high standard of accuracy which they inculcate in general, the positive and explicit statement which they make upon all real and important assumptions, the natural character of the arrangement, the complete and perfect absence of false conclusion or fallacious reasoning, and the judicious choice of the demonstrations, considered with reference to the wants of the beginner, are the causes of the universal celebrity which this book has enjoyed.

There are thirteen books certainly written by Euclid, and two more (the fourteenth and fifteenth) which are supposed to have been added by Hypsicles of Alexandria (about 170 A.D.).

Book i. lays down the definitions and postulates required in the establishment of plane geometry, a few definitions being prefixed also to ii., iii., iv., and vi. It then treats of such properties of straight lines and triangles as do not require any particular consideration of the properties of the circle nor of proportion. It contains the celebrated proposition of Pythagoras.

From this book it appears that Euclid lays down, as all the instrumental aid permitted in geometry, the description of a right line of indefinite length, the indefinite consideration of such a right line, and the description of a circle with a given centre, the circumference of which is to pass through a given point. It is usual to say, then, that the rule and compasses are the instruments of Euclid's geometry, which is not altogether correct, unless it be remembered that with neither ruler nor compasses is a straight line allowed to be transferred, of a given length, from one part of space to another. It is a plain ruler, whose ends are not allowed to be touched, and compasses which close the moment they are taken off the paper, of which the Greek geometry permits the use. It is altogether uncertain by whom these restrictive postulates were introduced, but it must have been before the time of Plato, who was contemporary with (if he did not come after) the introduction of those problems whose difficulty depends upon the restrictions.

Book ii. treats of the squares and rectangles described upon the parts into which a line is divided. It opens the way for the application of geometry to arithmetic, and ends by showing how to make a rectangle equal to any rectilinear figure. It also points out what modification the proposition of Pythagoras undergoes in the case of a triangle not right-angled.

Book iii. treats of the circle, establishing such properties as can be deduced by means of the preceding books.

Book iv. treats of such regular figures as can readily be described by means of the circle only, including the pentagon, hexagon, and quindecagon. It is of no use in what immediately follows.

Book v. treats of proportion generally, that is, with regard to magnitude in general. Whether this most admirable theory, which though abstruse is indispensable, was the work of Euclid himself, or a predecessor, cannot now be known. The introduction of any numerical definition of proportion is rendered inaccurate by the necessity of reasoning on quantities between which no exact numerical ratio exists. The method of Euclid avoids the error altogether, by laying down a definition which applies equally to commensurables and incommensurables, so that it is not even necessary to mention this distinction.

Book vi. applies the theory of proportion to geometry, and treats of similar figures, that is, of figures which differ only in size, and not in form.

Book vii. lays down arithmetical definitions; shows how to find the greatest common measure and least common multiple of any two numbers; proves that numbers which are the least in any ratio are prime to one another, &c.

Book viii. treats of continued and mean proportionals, showing when it is possible to insert two integer mean proportionals between two integers.

Book ix. treats of square and cube numbers, as also of *plane* and *solid* numbers (meaning numbers of two and three factors). It also continues the consideration of continued proportionals, and of prime numbers, shows that there is an infinite number of prime numbers, and demonstrates the method of finding what are called *perfect* numbers.

Book x. contains 117 propositions, and is entirely filled with the investigation and classification of incommensurable quantities. It shows how far geometry can proceed in this branch of the subject without algebra; and, though of all the other books it may be said that they remain at this time as much adapted for instruction as when they were written, yet of this particular book it must be asserted that it should never be read except by a student versed in algebra, and then not as a part of mathematics, but of the history of mathematics. The book finishes with a demonstration that the side and diagonal of a square are incommensurable. From this book it is most evident that the arithmetical character of geometrical magnitude had been very extensively considered; and it seems to us sufficiently clear that an arithmetic of a character approximating closely to algebra must have been the guide, as well as that some definite object was sought—perhaps the attainment of the quadrature of the circle.

Book xi. lays down the definitions of solid geometry, or of geometry which considers lines in different planes and solid figures. It then proceeds to treat of the intersections of planes, and of the properties of parallelopipeds, or what might be called solid rectangles.

Book xii. treats of prisms, cylinders, pyramids, and cones, establishing the properties which are analogous to those of triangles, &c., in the first and sixth books. It also shows that circles are to one another as the squares on their diameters, and spheres as the cubes on their diameters, in which, for the first time in Euclid, the celebrated *Method of Exhaustions* is employed.

Book xiii., the last of those written by Euclid, applies some results of the tenth book to the sides of regular figures, and shows how to describe the five regular bodies. [Regular Figures.]

Books xiv. and xv., attributed to Hypsicles of Alexandria, treat entirely of the relative proportions of the five regular solids, and of their inscription in one another.

The writings of Euclid continued to be the geometrical standard as long as the Greek language was cultivated. The Romans never made any progress in mathematical learning. Boethius translated, it is said, the first book of Euclid (Cassiodorus, cited by Heilbronner), but all which has come down to us on the subject from this writer (who lived at the beginning of the sixth century) is contained in two books, the first of which has the enunciations and figures of the principal propositions of the first four books of the Elements, and the second of which is arithmetical. These books of Boethius continued to be the standard text-books until Euclid was brought in again from the Arabs.

Among the last-mentioned race geometry made no actual progress, though many of the works of the Greek writers were translated, and Euclid among the rest. There are several Arabic versions. D'Herbelot (at the words 'Aklides' and 'Oclides') states that the Orientals believe Euclid to have been a native of Tyre, and also that they frequently gave his name to the science which he taught. The same author gives the names of the Arabic versions, one of which, that of Nasir Eddin, the most celebrated of all, was printed at the Medicean press at Rome in 1594.

The first translation of Euclid into Latin of which the date can be tolerably well fixed is that of Athelard, or Adelard, a monk of Bath, who lived under Henry I. (about A.D. 1150). We believe that the translation (so called) of Campanus (printed A.D. 1482) is in fact that of Athelard, with a commentary by Campanus; for Campanus is not expressly described in the book as a translator, but as a commentator; add to which, that there is in the Bodleian Library a manuscript entitled 'Euclidis, &c., ex versione Adelardi de Arabico, una cum commento Magistri Campani Novariensis.' Scheibel (cited by Camerer and Hauber, in the preface of their edition, presently noticed) states that in his copy of Campanus the fact of the translation being that of Adelard was noted in a handwriting apparently as old as the edition itself

There is a considerable number of Greek manuscripts of the Elements, for which see Fabricius and Heilbronner. There is no account of the manuscripts which they consulted by the earlier Latin translators (from the Greek), nor by Gregory. It appears however that several, if not many, of the manuscripts are entitled Εὐκλείδου Στοιχείων Βιβλία ιε ἐκ των Θέωνος Συνουσιων, from which it was inferred that the compilation of the elements was the work of Theon, from the materials left by Euclid. It is certain that Theon, in his commentary on the Almagest, speaks of his edition (ἔκδοσις) of Euclid, and mentions that the part of the last proposition which relates to the sectors was added by himself. On looking at that proposition, it is found that the demonstration relative to the sectors comes after the 'ὅπερ ἔδει δειξαι,' with which Euclid usually ends his propositions. And Alexander, the commentator on Aristotle, who lived before Theon, calls that the *fourth* proposition of the tenth book which is the *fifth* in all the manuscripts. We can then distinctly trace the hand of Theon as a commentator, and may suspect that he performed the duty of a revising editor to the work of Euclid as it now appears; but there is not the smallest reason to suppose that Theon actually digested the work into the form which it now has. These remarks relative to the claims of Theon were first made by Sir Henry Savile, who opened the chair of geometry which he founded at Oxford by 13 lectures on the fundamental parts of the first book of Euclid, which were delivered in 1620, and published in 1621.

The earliest edition of the Elements is that of Ratdolt, Venice (1482), Latin. The earliest Greek is that of Grynæus, Basel, 1533. The earliest edition of all Euclid's works is the Latin version of Zamberti, Venice, 1505. The earliest English translation of the Elements is that of Henry Billingsley, a London citizen, afterwards Lord Mayor, London, 1570. The closest English translation (than which nothing can be closer) is that of Williamson, London, 1788, 2 vols. 4to. All the others mentioned are folios.

The manifold beauties of the Elements of Euclid secured their universal reception, and it was not long before geometers began to extend their results. It became frequent to attempt the restitution of a lost book by the description given of it by Pappus or others; and, from Vieta to Robert Simson, a long list of names might be collected of those who have endeavoured to repair the losses of time.

The application of algebra to geometry, of which some instances had been given by Bombelli, and many more by Vieta, grew into a science in the hands of Descartes (1596-1650). It drew the attention of mathematicians completely away from the methods of the ancient geometry, and, considering the latter as a method of discovery, the change was very much for the better. But the close and grasping character of the ancient reasoning did not accompany that of the new method: algebra was rather a half-understood art than a science, and all who valued strictness of demonstration adhered as close as possible to the ancient geometry. This was particularly the case in our own country, and unfortunately the usual attendants of rigour were mistaken for rigour itself, and *vice versâ*. The algebraical symbols and methods were by many reputed inaccurate, while the same processes, conducted on the same principles, in a geometrical form, were preferred, and even advanced, as more correct.

The methods of algebra, so far as expressions of the first and second degrees are concerned, apply with great facility to many large classes of questions connected with straight lines, circles, and other sections of the cone. Practical facility was gained by them, frequently at the expense of reasoning: the time came when a new Descartes showed how to return to geometrical construction with means superior to those of algebra, in many matters connected with practice. This was Monge, the inventor of *descriptive geometry*. The science of perspective and many other applications of geometry to the arts had previously required isolated methods of obtaining lines, angles, or areas, described under laws not readily admitting of the application of algebra, and its consequence, the construction of tables. The descriptive geometry is a systematised form of the method by which a ground-plan and an elevation are made to give the form and dimensions of a building. The projections of a point upon two planes at right angles to one another being given, the position of the point itself is given. From this it is possible, knowing the projections of any solid figure upon two such planes, to lay down on either of those planes a figure similar and equal to any plane section of the solid. In the case where the section is a curve, it is constructed by laying down a large number of consecutive contiguous points. The methods by which such an object is to be attained were generalised and simplified by Monge, whose 'Géométrie Descriptive' (the second edition of which was published in 1820) is one of the most elegant and lucid elementary works in existence.

The methods of descriptive geometry recalled the attention of geometers to the properties of projections in general, of which such only had been particularly noticed as could be applied in the arts of design or in the investigation of primary properties of the conic sections. From the time of Monge to the present this subject has been cultivated with a vigour which has produced most remarkable results, and promises more. Pure geometry has made no advance since the time of the Greeks which gives greater help to its means of invention than that which the labours of what we must call the school of Monge have effected.

GE'OPHILA, a genus of plants belonging to the natural order *Cinchonaceæ*. The species are creeping herbaceous plants, with stalked cordate leaves like those of a violet. *G. reniformis* is a native of moist shady places in the hotter parts of America. The root of this plant is emetic, and may be used with advantage as a substitute for ipecacuanha.

GEOPO'NIKA (or, a 'Treatise on Agriculture') is the title of a compilation, in Greek, of precepts on rural economy, extracted from ancient writers. The compiler, in his proemium, shows that he was living at Constantinople, and dedicated his work to the Emperor Constantine, sup-

posed to have been Constantine Porphyrogenitus, and the compilation is generally ascribed to Cassianus Bassus. Needham, in his Greek and Latin edition of the 'Geoponika,' Cambridge, 1704, has treated of the authorship of this treatise at great length. The work is divided into twenty books, subdivided into short chapters, which explain processes of cultivation adapted to various soils and crops, and the rural labours suited to the different seasons of the year; with directions for the sowing of the various kinds of corn and pulse, for the training of the vine, and wine-making. It also treats of olive plantations and oil-making, of orchards and fruit-trees, of evergreens, of kitchen-gardens, of the insects and reptiles that are injurious to plants, of the economy of the poultry-yard, of the horse, the ass, and the camel; of horned cattle, sheep, goats, pigs, &c., and the care they require; of the method of salting meat; and of the various kinds of fishes. Every chapter is inscribed with the name of the author from whom it is taken. The work is curious, as giving a course of ancient agriculture collected from the best authorities then existing. The best edition of the 'Geoponika' is that of N. Niclas, in Greek and Latin, with notes and indexes, 4 vols. 8vo., Leipzig, 1781.

GEORGE (LOUIS) I., King of Great Britain, was the son of the Electress Sophia of Hanover, one of the most accomplished women of her time, who, after the death, in 1700, of the last of the children of the Princess Anne (subsequently Queen Anne) was chosen by the British parliament, in 1701, to follow that princess in the succession. She was descended from Elizabeth, Queen of Bohemia, daughter of James I., whilst the kindred families of Savoy, &c., were sprung from the younger daughter of Charles I.; but the Electress was a Protestant, while those nearer than her in the line of succession were Roman Catholics: hence the preference and introduction of the House of Hanover. By the Treaty of Union with Scotland in 1706 the succession to the monarchy of the United Kingdom was again assigned to the Electress Sophia. During the reign of Anne, frequent attempts were made, both by the Tory and the Whig parties, to bring her and her son (created in 1706 Duke of Cambridge, and afterwards George II.) to England, which at last so enraged Queen Anne, that she wrote to both on the 19th of May, 1714, in such terms that the letter to the son could not be published, and the letter to the mother killed her. She was struck with apoplexy the day after its receipt. The queen died on the 1st of August following, and George I. ascended the British throne. He was born on the 28th of May, 1660. In 1681 he had come to England to pay his addresses to the Princess Anne, but returned immediately after landing, in obedience to his father's orders, and the next year married Sophia Dorothea, daughter of the Duke of Zell; hence probably the hostility of Anne to him and his mother. He succeeded his father, Duke Ernest, in the electorate, in 1698. In 1700 he aided the Duke of Holstein against Frederick IV. of Denmark; and during the war between England and France, which commenced in 1702, he, of course, steadily supported the former; although he would not consent to sacrifice what he conceived to be his duty as a German prince, when the English ministry prepared their original measures for the peace of Utrecht. The new king arrived with his son at Greenwich on the 28th of September. Already the Tories had been turned out, and a Whig ministry, including Viscount Townshend, and Mr. Walpole, afterwards Sir Robert, formed by the Lords Justices. The impeachment of Bolingbroke, Oxford, and others, was determined upon in a new parliament in January 1715; but these measures did not prevent the opponents of the dynasty from continuing their machinations. The rebellion in Scotland broke out, and was put down with difficulty. The parliament then repealed the Triennial Act, and extended the duration of parliament to seven years. The Treaty of Triple Alliance, concluded by George I. with France and Holland in 1717, was a defensive measure against Charles XII.; but the war with him was unimportant, and ended with his death in 1718. Meantime, in April 1717, the Whig ministry was broken up; and Lord Stanhope and the Earl of Sunderland obtained the chief power in the room of Viscount Townshend and Walpole. Addison became one of the principal secretaries. The intrigues of Cardinal Alberoni now led to a war with Spain, and to the formation of the Quadruple Alliance of Great Britain, France, the Emperor, and Holland, against Spain. The chief event of the war was Admiral Byng's victory over the Spanish fleet off the coast of Sicily, on the 31st of July, 1718. In June 1719, the second Jacobite rebellion was put down; and the same year peace with Spain was concluded. The reconciliation, in April 1720, of the king and his son, who had been long at variance, led to the re-introduction of Walpole into the ministry, and eventually, on the overthrow of the Stanhope and Sunderland administration in consequence of the South Sea scheme exposures, to his premiership, which lasted for twenty-one years; during which he had not only to contend against the persevering efforts of the friends of the Pretender (in 1722, for instance, when a conspiracy was discovered, in which Atterbury, Bishop of Rochester, was compromised), but he had also to deal with the consequences of the entanglement of the country in continental politics, through the Hanoverian connection, and which at length led to a war between the King of Spain and the Emperor engaged by the Treaty of Vienna, 30th April, 1725, on the one side, and England, France, and Prussia, combined, in accordance with the Treaty of Hanover, September 3, 1725, on the other. Gibraltar was besieged by Spain in 1726, and about the same time Admiral Hosier was sent out on an expedition against the West Indies, which proved disastrously unsuccessful. Preliminary articles of general pacification were signed at Paris, May 31, 1727. In the night between the 10th and 11th of June following George died at Osnaburg. By his queen, who died Nov. 2, 1726, at the Castle of Ahlen, in Hanover, where she had been immured since 1694 on a charge, generally disbelieved, of an intrigue with Count Koningsmark,

George I. had one son, George, who succeeded him, and a daughter, Sophia Dorothea, who married King Frederick II. of Prussia in 1706. The king is said to have made a left-hand marriage with the lady whom he created Duchess of Kendal in 1719. His other chief mistress was the wife of Baron Kilmansegg, created Countess of Darlington in 1722. Extensive changes were made in the laws during this reign. The Riot Act was passed, 1 Geo. I.; and an act for disarming the Scottish Highlands, 11 Geo. I. The first sinking fund, on a great scale, was established by Walpole, 3 Geo. I.; and although the principal was not reduced, but remained at about 52,000,000*l.*, the interest of the debt was decreased from 3,350,000*l.* to 2,217,000*l.*

GEORGE (AUGUSTUS) II., King of Great Britain, the only son of George I., was born at Hanover, October 30, 1683. On the 22nd of August, 1705, he married Wilhelmina Caroline, daughter of John Frederick, Margrave of Brandenburg Anspach. On the 9th of November, 1706, he was created duke of Cambridge. He distinguished himself at the battle of Oudenarde, 11th July, 1708, when Marlborough defeated the French. On the accession of his father to the British throne he was created Prince of Wales, and immediately became the centre of various political intrigues. On the 6th of December, 1716, while he held the guardianship of the kingdom during his father's visit to Hanover, he was shot at by a lunatic of the name of Freeman, in Drury Lane Theatre, but was not injured, and remained self-possessed and calm. A quarrel broke out between the prince and the king towards the close of 1717, the causes of which are not clearly known, but which led to much public discussion and scandal. The prince and princess were sent away from St. James's, and their children detained by the king's order, which was supported by the opinion of the judges. The parents in consequence declined to pay for the education of their children out of the 100,000*l.* a year which they received. The peerage bill of Geo. I. is supposed to have been instigated by the desire of the king to restrict the power of his successor. Though they were reconciled in 1720, it appears that the king left behind him a will, which was supposed to be peculiarly adverse to his son. This will was presented to George II. on his accession by Archbishop Wake, when the king put it into his pocket, walked out of the room, and nothing more was heard of the document.

George II. succeeded his father on the 10th of June, 1727. Through the influence of his queen, Walpole was continued in office. The war with Spain was terminated by the Treaty of Seville, 9th November, 1729. Ten years later it broke out again, through the alleged interference of that power with the freedom of English commerce. Portobello was reduced by Admiral Vernon in 1740; but repeated attacks on Carthagena signally failed. The death of the Emperor Charles VI., in 1740, led to a general European war. Great Britain supported the Pragmatic Sanction, by which the emperor's eldest daughter, Maria Theresa, queen of Hungary, succeeded to the Austrian dominions; whilst France and Spain maintained the claims of Charles Albert, elector of Bavaria, who two years later was elected emperor, under the title of Charles VII. Walpole's pacific policy now became distasteful. His popularity had been previously damaged by his attempt to extend the excise in 1733. Another family quarrel between George II. and his son broke out in 1739, and the latter formed a party, avowedly to overthrow the premier; and lastly, in the same year (November 20), the queen, Walpole's patroness, died. A new parliament met in December 1741, and Walpole found it necessary to retire in the January following, when he was created Earl of Orford. His rival Pulteney succeeded. A reconciliation took place between the king and prince, but the latter was soon once more in open opposition to the court and ministry. The war was at this time prosecuted with vigour by the English and their allies. The kings of Denmark and Sweden were subsidised, and a treaty of alliance was concluded with Prussia. On the 26th of June, 1743, the French were defeated at Dettingen, and George II., who was present, behaved with distinguished courage. Inactivity and reverses followed. The war party in the ministry, under Lord Granville, was expelled, and a new ministry was formed, of which Mr. Pelham, brother of the Duke of Newcastle, was first lord of the treasury, and Mr. Pitt, afterwards the Earl of Chatham, was a supporter. But the king's former policy was still maintained; and on the 30th of April, 1745, the allies were defeated by the French at Fontenoy. The same year broke out the great Scottish rebellion. The king's troops were defeated at Preston Pans and Falkirk, and the pretender reached Derby; but at last the king's second son, the Duke of Cumberland, defeated him at Culloden, April 16, 1746. Two years later the Treaty of Aix-la-Chapelle brought the continental war to a close, after some brilliant naval successes on the part of Great Britain. Cape Breton was then restored to the French, and Madras to the English. The death of the Prince of Wales on the 20th of March, 1751, rendered a regency necessary; and great divisions broke out in the ministry on the subject. The death of Mr. Pelham, March 6, 1754, produced new contentions. At last, in November 1755, Pitt and his party were dismissed, and Fox, under the Duke of Newcastle, became the moving spirit of the ministry. War had again broken out with France in the preceding June. Minorca and Calcutta were taken by the French in 1756, and the ministers were soon afterwards dismissed. Pitt became premier in December, but was succeeded in June 1757 by the Earl of Waldegrave, with Fox as secretary of state. Pitt again succeeded them within two or three weeks, in conjunction with the Duke of Newcastle and Fox, and, by that powerful coalition, affairs were conducted until the close of the reign. The war now became general. Great Britain had allied herself with Prussia in January 1756, and France with Austria in May of the same year. The enemy were driven out of Bremen and Verden in Germany, in 1758; Senegal and Goree were taken from the French on the African coast soon afterwards; the victory of

Minden was gained on the 1st of August, 1759; the French navy was almost annihilated; the conquest of Canada was nearly completed by Wolfe's victory on the heights of Abraham, September 13, 1759; and lastly, Clive in India having regained Calcutta, Jan. 2, 1757, and overthrown the Subahdar of Bengal at Plassy, June 23, was rapidly expelling the French from India, when George II. suddenly expired at Kensington Palace (from rupture of the right ventricle of the heart), on the 25th of October, 1760. His children by his queen were three sons and five daughters, of whom the most remarkable were Frederick, prince of Wales, who, as we have stated, died in 1751 (and whose son, George, succeeded George II. on the throne), and William Augustus, duke of Cumberland, the victor at Culloden. George II., as well as his father, had a succession of mistresses; the two principal were Mrs. Howard and the Countess of Yarmouth, who was the last individual raised to the peerage in England by so scandalous an abuse of the honours of the state. Among the legislative acts of the reign may be mentioned those for causing all law proceedings in the English courts of justice and in the Scotch court of exchequer to be carried on in the English language (4 Geo. II.); and this was extended to Wales two years later; allowing counsel to persons tried for treason, 20 Geo. II.; the use of the new style, 24 Geo. II.; the foundation of the British Museum by the purchase of the Sloane Museum and Harleian MSS., 26 Geo. II.; and the marriage act, 26 Geo. II. The National Debt was increased during this reign, and amounted at the close of the Seven Years' War, in 1763, to nearly 139,000,000*l.*; and the interest to above 4,850,000*l.*

GEORGE (WILLIAM FREDERICK) III., eldest son of Frederick Louis, Prince of Wales, and grandson of George II., was born 4th June, 1738. His mother was Augusta, daughter of Frederick II., duke of Saxe Gotha, who was married to the prince, 25th April, 1736, and had by him four other sons and four daughters. After the death of the prince, George William was himself created Prince of Wales. During his youth his mother kept him in great seclusion. His education was made the subject of much political intrigue and dissension. Eventually Lord Harcourt and Dr. Hayter gave place in 1752 to Lord Waldegrave and Dr. Thomas, then bishop of Peterborough, as the governor and tutor of the prince. The instigator of these changes is understood to have been Lord Bute. On the whole, it appears the young prince was educated virtuously, but within very narrow limits. He ascended the throne on the death of his grandfather, 25th October, 1760. On the 8th of September following he married Charlotte Sophia, second daughter of Charles Lewis Frederick, duke of Mecklenburg Strelitz. Lord Bute was soon introduced into the ministry (in 1761), in order, it is supposed, to aid the king in bringing the war to a close. Pitt resigned in October 1761, on the cabinet refusing to declare war against Spain, which however broke out in January 1762. The resignation of the Duke of Newcastle made way for the elevation

of Lord Bute to the premiership in June 1762, an event soon followed by a general peace. By the Treaty of Paris, Feb. 11, 1763, England retained Canada, acquired Florida from Spain, and recovered Minorca, but gave up Belleisle, the Havanna, and the settlements taken from France in the East Indies. Lord Bute resigned April 8, 1763, and was succeeded by Mr. Grenville, whose ministry was soon engaged in the famous contest with Wilkes. [Wilkes.] The king became ill in April, 1764, and, on his recovery in a few weeks, he proposed that a bill should be brought in empowering him to appoint the queen or any other member of the royal family, to act, in case of his demise, as regent during the minority of his successor. By Lord Bute's manœuvres the ministers were placed in opposition to the desires of the king, and were defeated in parliament on the Regency Bill, which was subsequently passed. On the 22nd of March, 1765, certain stamp duties were imposed upon the American colonies; but, the king having found himself strong enough to dismiss the Grenville ministry, the new one formed by the Marquis of Rockingham, in July 1765, repealed the act in 1766. This ministry soon fell, and the Pitt administration succeeded in June 1766. Pitt was created Earl of Chatham; and on the 2nd of June, 1767, Mr. C. Townshend, the chancellor of the exchequer, brought forward that renewed measure of American taxation which eventually led to American independence. Mr. Townshend died suddenly 4th September, and was succeeded by Lord North, as chancellor of the exchequer, with the Duke of Grafton as first lord of the treasury. Lord Chatham resigned, 15th of October, 1768; and the Duke of Grafton, apparently unable to endure the memorable attacks of Junius, which commenced early in 1769, suddenly resigned, January 28, 1770. Lord North then became premier, and sought to allay the excitement in English America by repealing the obnoxious duties, with the exception of the tax on tea, which was avowedly retained to assert the right of taxation—the very right that was denied. In 1771, the newspaper press, after a contest of two months, successfully asserted its right to report the parliamentary debates. The marriage in this year of the king's third brother, the Duke of Cumberland, with Mrs. Horton, and the announcement of a previous marriage by the king's second brother, the Duke of Gloucester, with the Countess of Waldegrave, greatly offended George III., and led to the passing of the Royal Marriage Bill. The king's mother died on the 8th of February, 1772. Only a few days previously his youngest sister had been thrown into confinement by her imbecile husband the king of Denmark, on a charge of adultery with her physician, Struensee, who was executed, with his friend Brandt, without having had a trial. Through the interposition of George III., she was ultimately removed to Zell, in Hanover, where she died 10th May, 1774. The disturbances in America broke out in 1773. The Gaspee schooner was attacked and burnt at Providence in Rhode Island in June; and the destruction of the tea by the mob at Boston took place in December. The

first battle, at Lexington, occurred 19th of April, 1775; that of Bunker's Hill followed 15th June; and on the 4th of July, 1776, was issued the American Declaration of Independence. Many French officers joined the Americans, and it became evident that the governments both of France and Spain meant to assist the revolted colonies. Burgoyne surrendered at Saratoga, 16th October, 1777. The following year France acknowledged the American independence. The surrender of Lord Cornwallis at Yorktown, 19th October, 1781, in effect terminated the struggle. These events led to a war with France, in 1778; with Spain, in 1779; and with Holland, in 1780. The same year, Russia, Denmark, and Sweden combined for the maintenance of an armed neutrality, which was intended in fact to prevent Great Britain from enforcing the usual rights of belligerents. At home the Gordon or Protestant riots broke out, and London was nearly a week in the hands of a devastating mob. In Ireland, fifty or sixty thousand armed volunteers assumed a threatening aspect. In the East Indies, Hyder Ali was carrying all before him. At last Lord North and his colleagues resigned, 20th March, 1782, and were succeeded by the Marquis of Rockingham, who died within three months. Lord Shelburne then assumed the direction of affairs, upon which Fox and his friends resigned. Mr. Pitt (the younger) became chancellor of the exchequer. The American independence was acknowledged by Great Britain at Paris, Nov. 30, 1782, when preliminaries of peace were signed with America, France, and Spain. Peace with Holland was concluded the following year. About the same time the independence of the Irish Parliament was reluctantly acknowledged. The famous coalition between Lord North and Fox had in the meantime overthrown Lord Shelburne's ministry, but had itself been speedily ejected from power in favour of a Pitt administration, which, after a very severe struggle, firmly established itself. The subject of Parliamentary Reform now greatly agitated the country. On the 2nd of August 1786, an attempt on the king's life was made by a mad woman, named Margaret Nicholson, who struck at him with a knife as he was alighting from his carriage, but missed her aim. In November 1783, the king was attacked by what was admitted to be insanity, and did not recover until March. The history of the remainder of his reign is chiefly that of the share borne by England in the wars which grew out of the French Revolution of 1789. Mr. Pitt was at first opposed to the war with France; but his party, the court, a large section of the Whigs, headed by Burke, and a great portion of the country, urged it on. The general course of the war, down to its final conclusion at Waterloo, in 1815, has been already sketched in the article BONAPARTE, to which the reader is referred. The king was attacked by the mob on his way to the House of Lords, 29th October, 1795. In 1800 he was fired at by a maniac named Hatfield, in Drury Lane Theatre. The Union of Great Britain and Ireland was effected the same year; and Mr. Pitt retired, as the king refused to consent to the removal of the Catholic disabilities, a measure to which the minister considered himself pledged. The administration of the Right Hon. Henry Addington (afterwards Lord Sidmouth) succeeded. On the 25th March, 1802, peace was concluded at Amiens, but lasted only a few months. The war was then renewed and only brought to a close at Waterloo. The only chief political events were the recurrence of the king's malady in 1801 and 1804; the restoration of Mr. Pitt to power, May 1804; his death on the 23rd of January, 1806, and the consequent formation of a ministry under Fox and Lord Grenville; the death of Mr. Fox, September 13; the dissolution of the Grenville administration in March 1807, on the question of Roman Catholic relief; the formation of a new cabinet under the Duke of Portland and Mr. Percival; resignation of the command of the army by the Duke of York, March 1809, in consequence of the result of an inquiry on charges of corrupt practices (of which his mistress Mrs Clarke reaped the profits); the celebration of the jubilee on the 25th of October, 1809, the fiftieth anniversary of the king's accession; the decided insanity of the king, October 1810, and the appointment of the Prince of Wales as regent, February 1811; the assassination of Mr. Percival, 11th May, 1812; and the appointment of the Earl of Liverpool as premier, whose ministry lasted till the end of the reign. The king died at Windsor Castle, 29th January, 1820. He had been entirely blind for some years before his death. By his queen, Charlotte, who died at Kew, 17th November, 1818, George III. had nine sons and six daughters. During his reign the financial operations of the country assumed a gigantic magnitude. The revenue from taxation was increased to about 53,000,000*l.*, and in 1815 had amounted to above 72,000,0000*l.* The national debt was increased from 108,000,000*l.* to above 800,000,000*l.* Among the immense mass of legislation of the reign may be noticed Fox's Libel Law, 1792, declaring juries to be judges of the law as well as of the fact; the abolition of the Slave Trade, 1807; Romilly's acts of 1811 and 1818 for the amelioration of the criminal law; the Unitarian Relief act of 1813; and the Six Acts of 1819 for the suppression of blasphemy and sedition.

GEORGE (AUGUSTUS FREDERICK), IV., King of Great Britain, and eldest son of George III., was born Aug. 12, 1762, and was on the 17th created Prince of Wales and Earl of Chester. He was educated with his brother, Prince Frederick, bishop of Osnaburg, afterwards duke of York, in great privacy, and under strict discipline. It was not till 1780 that the prince appeared much in public life. Of the many mistresses of the Prince of Wales the first was Mrs Mary Robinson, an actress, and the authoress of various poetical pieces, novels, &c., and who has related her own story in her 'Memoirs' published after her death by her daughter. About 1780 the Prince became intimate with Fox, Sheridan, and other Whig and opposition leaders, and with them indulged in all the extravagance and dissipation of the fashionable life of the time. In the parliament of 1783 he appeared as one of the supporters of the coalition ministry, which in return demanded

and obtained an increased establishment for the Prince. Increasing debts however involved him deeper and deeper in embarrassment, and the subject was, in April 1787, formally brought before parliament by Alderman Newnham. A grant of 160,000*l.* was made for the payment of the Prince's debts, and 20,000*l.* for the repairs of his residence, Carlton House, London. It was on this occasion of Alderman Newnham's motion that Mr. Fox came to the House, on the express authority of the Prince, to allay the excitement that had been caused by a rumour that the Prince had married a lady, named Mrs. Fitzherbert, who was a Roman Catholic, and that he had thus incapacitated himself to succeed to the crown, according to the Act of Settlement. Mr. Fox denied, in the most explicit manner, that any such marriage had taken place. It is however tolerably clear that he had been deceived by the Prince. Mrs. Fitzherbert at first demanded a public retractation; and although she yielded that point, she would never speak to Mr. Fox again, who, on his part, complained strongly of the duplicity to which he had been subjected. In the summer of 1791, the Prince retired from the turf in consequence of the demand of the Jockey Club that he should dismiss a servant accused of unfair conduct with one of the Prince's horses, or should himself retire. Soon afterwards he sold off his horses, shut up Carlton Palace, and began to lessen the amount of his debts. On May 31, 1792, by his public speech in the House of Lords, he separated himself for a time from Mr. Fox and his party, and went over to the minister in the division that then took place on the subject of the French Revolution. In 1794, borne down by the load of his debts, he consented to the only terms on which his father would agree to aid in relieving him from them — marriage; and he became the husband of Caroline Amelia Elizabeth (second daughter of the Duke of Brunswick and of the Princess Augusta), April 8, 1795. Disgust and alienation soon followed. The demand of the Princess for the removal of Lady Jersey was met with a decided refusal, and although a daughter, the late Princess Charlotte Augusta, was born 7th of January, 1796, they separated finally soon after. In 1806 a commission of inquiry into the conduct of the Princess was instituted by the Prince's friends. That commission decidedly acquitted her of the main charge of having given birth to a child (William Austin) in 1802, but stated that her conduct had been such as to give rise to very unfavourable interpretations. A subsequent minute of the cabinet council, April 1807, when the Tories were in power, was much more favourable to the Princess. The evidence taken was published surreptitiously in 1813, in a volume entitled 'The Book.' On the 3rd of February, 1811, the Prince entered on his office as regent, during his father's illness, and, to the surprise of all, retained the Tory ministry then in power. The course of public events have been noticed or referred to in the preceding article. On the 2nd of May, 1816, the Princess Charlotte married Prince Leopold, now king of the Belgians, and died in childbed on the 6th of November, 1817. On the 5th of January, 1817, the Prince-Regent had been shot at in the park, but was not injured. This occurrence, in connection with the excited state of the public mind, led to the suspension of the Habeas Corpus Act, and other measures curtailing public liberty. Not one of the seven sons of the king having at this time any issue, the dukes of Clarence, Kent, and Cambridge, all married in 1818, in order to provide for the continuance of the line of succession.

The Prince-Regent ascended the throne as king on the death of his father, 29th of January, 1820. The Cato Street conspiracy broke out on the 23rd of February following. The Princess, now Queen Caroline, who had gone to the Continent in 1816, returned to London on the 6th of June; and a Bill was brought into the House of Lords for divorcing and degrading her. On the 10th of November the third reading of the bill was carried by only 108 votes to 99, and as this division destroyed all chance of the measure being passed by the Commons, the Bill was abandoned. At the coronation on the 19th July, 1821, the queen was refused admittance into Westminster Abbey, when she came there to assert her claim as queen-consort. She was taken ill a few days afterwards, and died at Brandenburg House, Hammersmith, on the 7th of August. The suicide of the Marquis of Londonderry in 1822 produced some change in the foreign policy of the government. [Canning, George.] The other chief ministerial changes of the reign were the death of Lord Liverpool, February 17th, 1827, and the accession of George Canning; the death of the latter on the 8th of August, and the formation of the Goderich ministry; its resignation on the 25th of January, 1828, and the appointment of the Duke of Wellington, as head, at first, of a ministry of men of different views, but which ultimately became purely Tory. The chief public events during the same period were the Birmese War in 1825-6; the great commercial crisis of 1825; the aid rendered to Don Pedro, in Portugal, in 1826; the death of the Duke of York, 22nd of January, 1827; the destruction of the Turkish fleet at Navarino soon after; followed on the 6th of August, 1828, by a convention between Sir Edward Codrington and Ali Pacha, viceroy of Egypt, for the evacuation of the Morea by the Turkish troops, and the return home of the Egyptian armament; the success of Lord John Russell's resolution for the repeal of the Test and Corporation Acts, on the 26th of February, 1828, followed by the passing of the act on that subject; the return of Mr. O'Connell, a Roman Catholic, for the county of Clare, in Ireland, July 5, 1828, and the enactment in 1829 of the Roman Catholic Emancipation Bill, which received the royal assent on the 13th of April. On the 26th of June, 1830, the king died at Windsor. Among other legislative acts of the reign must be mentioned, the general consolidation and improvements of the criminal law by Mr. Peel, now Sir Robert; the Uniformity of Weights and Measures' Act, and the repeal of the combination laws in 1824; the act to prevent Arrest on mesne process in cases under 20*l.*, the Corn-importation Bill in 1827; the Metropolitan Police Act of 1829; the repeal of the Beer

Duties, and the substitution of transportation for death in cases of Forgery in 1830.

GEORGE OF DENMARK, PRINCE, the youngest son of Frederick III., king of Denmark, was born 21st April, 1653. At the battle of Lunden, fought between the Swedes and Danes, 14th December, 1676, Prince George distinguished himself by his bravery, and was the chief instrument in the rescue of his brother, then king, Christian V., from the enemy, who had taken him prisoner. He was married to the Princess Anne, afterwards Queen Anne, 28th July, 1683. When the Revolution came, he stayed with James II. almost to the last hour of his sovereignty; but at length he also departed from King James at Andover, on the night of the 24th of November, 1688, to meet William at Sherborne Castle, having left behind him a letter to his father-in-law, in which he attributed his secession to zeal for the Protestant religion. Under the new dynasty Prince George was naturalised, and was created an English peer by the titles of Baron of Wokingham, Earl of Kendal, and Duke of Cumberland. He was with William III. at the battle of the Boyne. On the accession of Anne, his wife, Prince George was declared generalissimo of all the forces by sea and land. He was also made lord high admiral; and, though the actual power was exercised by Marlborough's brother, Admiral George Churchill, loud complaints were made in 1703, 1704, and 1707, of the administration of the Admiralty. Prince George had little capacity and less love for business. He died at Kensington Palace, 28th October, 1708, after an illness of several years, during which the queen proved herself a tender and affectionate wife. They had no less than nineteen children; not one of whom lived to inherit the throne. William, duke of Gloucester, who lived the longest, was a boy of great promise: he died 30th July, 1700, at the age of 11 years.

GEORGE I., surnamed the Long-Handed, Grand-Duke of Russia, was the only son of Vladimir Monómachos, who was three times married; and one of his wives was Gyda, daughter of Harold, the last Saxon king of England. After the death of her husband at the battle of Hastings in 1065, she retired to Sweden, and afterwards was married to Vladimir. George I. may have been her son. Having received for his appanage the principality of Soozdal in European Russia, he succeeded, after many vicissitudes, in establishing himself as Grand-Duke of Kieff in 1155, in the place of his nephew Isiaslaf. George founded many new towns in his dominions, and peopled them with settlers of the Sclavonian and Finnish races. This is the origin of the population of Grand Russia. Moscow was founded by him, in a spot where, it is said, George had caused to be murdered the husband of a woman of whom he was enamoured, and there he took up his residence. He died in 1157. His son Andrew greatly increased the power of the northern principalities; and although he lost Kieff in 1159, which was taken from him by his son and a coalition of other princes, he assumed the title of Grand-Duke of Russia in his own dominions, and there, at his capital, Vladimir, he maintained and strengthened his power. He was murdered by some conspirators in 1174. After two years of civil war, during which Michel, Prince of Rezan, occupied for some time the throne of Vladimir, Vsevolod, brother of Andrew, and son of George I., obtained the grand ducal dignity, which he retained till his death in 1212.

GEORGE II., son of Vsevolod, and grandson of George I., became Grand-Duke after the death of his rival, the Grand-Duke Constantine, in 1219. The Moguls, in 1224, in an expedition sent by Gengis Khan, under his son Joodgee Khan, attacked the Polovtzee, a nomadic nation occupying the countries along the shores of the Black Sea, from the Don to the Danube; and, having defeated them, the Polovtzee fled to their Russian neighbours for assistance. The princes of the south of Russia formed an army, and marched against the Moguls; but their internal dissensions and the cowardice of the Polovtzees led to their defeat on the 31st of May, 1224. The Moguls, after advancing to the Dnieper, retired, and nothing more was heard of them until 1237, when Batoo Khan, grandson of Gengis Khan, entered the principalities of Rezan with an army of 800,000 men. Rezan was taken and destroyed; Moscow, Kolomna, and other cities soon shared the same fate. At length the storm burst on George II., who had refused to aid the Duke of Rezan, relying upon his own power to defend himself. His capital, Vladimir, was taken by storm, and was destroyed, February 1238, and George's two sons perished in its defence. George was then attacked in his fortified camp on the bank of the river Sit, and, after a brave struggle, was killed on the 4th of March, 1238. The Moguls soon retired beyond the Volga, but the next year they again invaded Southern Russia, and penetrated as far as Liegnitz, in Silesia, where they were defeated by the Silesian dukes and the Germans. Batoo Khan returned to the banks of the Volga, where the Grand-Duke Yaroslaf, brother to George II., acknowledged the sovereignty of the Grand-Khan. Thus commenced the Mogul or Tartar dominion in Russia, which lasted till about 1470.

GEORGE, ST., surnamed of Cappadocia, was a native of Epiphaneia in Cilicia, and is said to have been born in a fuller's shop. By his parasitical arts he obtained a lucrative commission to supply the army with bacon; but his frauds became so notorious that he fled from justice, and went to Alexandria, where he assumed a religious character, and embraced the profession of Arianism with such success, that, when Athanasius was driven from Alexandria, George was elevated to the vacant episcopal throne. In this situation he collected a valuable library, but so excited the fury of the people by his avarice and extortions, that he was expelled during the reign of Constantius, and was only restored by the military power of the state. On the accession of Julian, A.D. 361, George was stripped of his authority, and thrown, with two of his ministers, into prison. The popular fury did not wait for the forms of law, and at the end of ten days the prison was forced, George and his associates slaughtered, and their bodies cast into the sea. The Arians introduced his name

into the Saints' Calendar in consideration of his services to their cause. When our Crusaders went to the east in 1096, they found St. George elevated to the rank of a warrior-saint, with the title of the 'victorious;' and, as they believed that they were indebted to him for aid at the siege of Antioch, they adopted him as the patron of soldiers. Edward III. was thus led to make him patron of the Order of the Garter, and so gradually St. George became the tutelary saint of England.

GEORGE, ST., is one of the Azores or Western Islands. It lies between 27° 50′ and 28° 20′ W. long., and 38° 30′ and 38° 45′ N. lat., between the islands of Terceira and Pico. It is a long narrow island, extending in a west-north-west and east-south-east direction, about 35 miles, with a breadth of about 5 miles.

The island appears to be entirely composed of volcanic rocks, and is subject to volcanic eruptions; of which the last, and perhaps most violent, was in 1808. The climate is extremely agreeable, the temperature varying from 50° to 75°. Incessant gales prevail. St. George yields all the productions of the Azores, and in greater excellence than most of them. Indian corn is grown. The yams are fine and abundant. Oranges and lemons are cultivated with great success. The higher grounds afford excellent pasture for cattle, which are exported to Madeira and Lisbon. Butter and cheese are sent in large quantities to Horta.

St. George is in the department of Angra; its capital is Ponto de las Velas. The island was taken possession of by the Portuguese in 1450, and colonised by Portuguese and Flemings. The population exceeds 20,000. Having no good harbour, Angra and Fayal have become in effect the commercial ports of St. George.

GEORGETOWN. [Columbia, District of.]

GEORGIA. This article comprehends not only a description of Georgia Proper, but of all the countries between the Black and the Caspian Seas of which Russia either holds or claims possession, and which form dependencies of the government of Georgia, or, as the Russians call it, Grusia. This tract extends from 38° 31′ to 43° 30′ N. lat., and from about 41° to 52° 12′ E. long. It is inclosed on the north by the range of the Caucasus, which forms a part of the country; on the east it is washed by the Caspian Sea, and on the west by the Black Sea; on the south it is bounded by Persia and Asiatic Turkey, having a line of frontier on that side of about 600 English miles. Its greatest length from N. to S. is about 500 miles, and greatest breadth from E. to W. about 480 miles.

This region, which was partially known to the Greeks and Romans, was for many centuries afterwards a theatre of war between the emperors of Constantinople and the kings of Persia. In the eighth and ninth centuries, it was under the Caliphs of Bagdad; in the eleventh and twelfth it was under the rule of native Georgian kings; in the thirteenth and fourteenth, it was under the power of the Moguls or Tartars. Then commenced a splitting up of the region into smaller and separate states, concerning which the Turks and Persians were for two or three centuries frequently at war. The Russians, who had from the sixteenth century begun to acquire some influence in this quarter, made an expedition in 1724 against the highlanders of Daghestan, and took Derbend. This expedition was followed by a treaty with Tamas Shah of Persia, who, being driven from his states by the Afghans, ceded to Russia, on the promise of being restored to his throne, the provinces of Daghestan, Shirvan, Ghilan, Mazanderan, and Asterabad. Although the promised assistance was never given, the provinces were taken possession of by Russia, and held till the year 1735, when they were restored by the Empress Anne to the celebrated Nadir Shah. After the death of Nadir, Georgia was for many years under native kings, who sought Russian protection against Persia; and, at the death of one of these kings in 1800, Georgia was declared a Russian province, and the members of the reigning family were carried to Russia. Other provinces in this region gradually fell into the hands of Russia, and were confirmed to it by treaties made in 1813, 1828, and 1829.

The mountain-ranges of this region are described under Ararat and Caucasus. The country immediately north of the Caucasus is noticed under Circassia.

The principal rivers which drain the Caucasian isthmus are—the Koor, or ancient Cyrus, the Araxes, the Rion or Faz (the ancient Phasis), the Kooban, and the Terek, besides numerous smaller rivers and streams.

The country, though generally mountainous, contains some extensive plains. The climate is very varied. Of wild animals there are the panther, the jackal, the tiger, the bear, the wolf, &c. Besides the domestic animals common to the northern countries, there are great numbers of camels and asses. The slopes of the mountains are covered with large forests, which produce timber of the best description. The chief vegetable products are grapes, cotton, madder, rice, and saffron.

There is every reason to believe that great mineral wealth is concealed in the mountains, but hitherto nothing of any importance has been discovered. The present commerce of these countries by the Caspian Sea is carried on from the ports of Derbend, Baku, Shamakhi, and Lenkoran, to Persia, and to Astrakan. The overland trade is with Russia and Persia, as well as with Asiatic Turkey. The commerce by the Black Sea is carried on from the mouth of the Rion with Odessa and other Russian ports, as well as with Constantinople; and there is a small traffic with the highlanders of the Caucasus.

The whole region is under a Russian governor, who resides at Tiflis. The Christian and Mohammedan population have their respective religious chiefs. The country is politically divided into the following provinces:—Georgia Proper, the Armenian provinces, the provinces of Daghestan, Akhalzik, Imiretia, Baku, Kooba, Shirvan, Sheki, Talish, and Karabagh. Besides these provinces, which are incorporated in the Russian empire, the following states acknowledge her sovereignty or claim her protection, although they are governed by native princes:—Mingrelia, Gooria, or Gouriel, and some petty states in Daghestan.

Georgia Proper, as at present constituted, con-

tains about half a million inhabitants. The principal town is TIFLIS. The language of Georgia is very much like the Armenian language, but with a great addition of foreign words. The Armenians introduced both Christianity and printing into Georgia. The population of the province of Georgia amounts to about 390,000, and is divided into the following classes: — 1, the Tavadis, who constitute the higher nobility, and who now rank as Russian princes; 2, the Asnauris, or nobles; 3, the Mokalaks, or citizens, most of whom live in Tiflis and other towns, and are engaged in trade; 4, the Glekhs or peasants, who are serfs.

The other towns of Georgia are—Signakh, with 3000 inhabitants; Telay, a well-built town in the oriental style, with more than 3000 inhabitants; Doochet, a fortified place, with about 1300 inhabitants; Goree, a commercial town, with about 3500 inhabitants; and Elizabethpol, or Ganjah, formerly the capital of a Khanat, and the residence of a vassal prince, with 6000 inhabitants.

Imiretia.—This small district lies between 41° 45′ and 42° 40′ N. lat., and between 42° 9′ and 43° 39′ E. long. Being sheltered from the northern winds by the Caucasus, its climate is mild, and in many parts the trees blossom and produce fruit twice a year. Its population, which amounts to 100,000, consists chiefly of Imiretians and a few Armenians. The Imiretians speak a dialect of the Georgian language, and are politically divided into the same classes as the Georgians. The government is vested in a Russian general, under the governor-general of Georgia. The province is divided into four districts: Kootais, Vakee, Shoropan, and Rachee. The only town is Kootais, which is divided into the old and new town; the former contains a church built in a splendid style of Byzantine architecture. The new town is constructed in the European manner, and its streets are planted with nut, fig, and other trees.

Akhalzik.—This province is situated between 41° and 42° N. lat., and between 42° 39′ and 44° 1′ E. long. It is hilly, but fertile. The population, which amounts to 70,000, consists of Armenians, Georgians, Greeks, Koords, Turks, Jews, and Gipsies. The only town of importance is Akhalzik, with 14,000 inhabitants.

The *Armenian Provinces* are composed of the khanats of Erivan and Nakhichevan. The former contains about 140,000 inhabitants, and the latter about 40,000. The surface and products of Erivan resemble those of Georgia Proper. Besides the chief town, ERIVAN, there are the fortress of Sardar Abad, and the Armenian convent of Echmiadzin. Nakhichevan is divided into two districts, Nakhichevan and Ordoobad. The chief towns are Nakhichevan (once a place of great importance), Abbasabad, and Ordoobad.

Shirvan, of which the population is about 70,000, borders on the Caspian Sea, and is for the most part very fertile, but unhealthy. The inhabitants are mostly of the Turkish race, and are divided into several classes, each of which has its peculiar privileges. Besides the Turks, there are Persians, Arabs, Armenians, Jews, and Gipsies. The chief products are rice, silk, wine, some cotton, and tobacco. The industry of Shirvan consists chiefly in the manufacture of silken stuffs, cotton goods, tanned leather, arms, copper vessels, and a few metal goods. The commerce which is carried on with Persia by the Caspian Sea, and with Astrakan and Tiflis overland, is not considerable. The chief town is Old Shamakhie, once a place of much trade and importance, but now much decayed.

Talish is situated between 38° 31′ and 39° 31′ N. lat. This province is entirely mountainous, with the exception of one great plain, which runs between the mountains and the sea. Its soil, with few exceptions, is a black loam capable of producing the most luxuriant vegetation; but the cultivation is in a backward state. The climate is unhealthy on account of the existence of swamps, which harbour a large number of snakes and other venomous reptiles. There are two ports or roadsteads, Lenkoran and Sara; and one wretched town, Lenkoran.

The province of *Karabagh* has several hills 5000 feet in height, an abundance of fine forests, and a large plain. The country is drained by the Koor, the Araxes, and other rivers. The products are mostly those of a temperate climate. The population of Karabagh consists chiefly of Mohammedans and Armenians, to the number of about 16,000 families. The Armenians have a nobility and a numerous clergy, grossly ignorant. The only town is Shooshee, a small fortified place, in which some missionaries from Basel have done something to introduce education.

The province of *Sheki* is situated between 40° 10′ and 41° 16′ N. lat., and 45° 56′ and 48° 7′ E. long. The country is generally mountainous, but there are also some level tracts; the climate is temperate, except during the few summer months, when the heat becomes oppressive in the plains. The products consist of grain, silk, cotton, cattle, and sheep. The population, consisting of about 120,000, comprises Mohammedans, Armenians, and Jews. The towns are—Nookha, with 6000 inhabitants; Sheki, now a small village; and Fitdagh, a small fortress.

Baku is described elsewhere. [BAKU.]

Daghestan, lying between 40° 30′ and 43° 50′ N. lat., on the west coast of the Caspian, is a small province inhabited mostly by mountain tribes who pay very little attention to Russian orders. The town of *Derbend* is built on a declivity of the Caucasus; it is strongly fortified, and has some trade on the Caspian. The population is probably about 10,000.

The province of *Kooba* borders on that of Baku on the south. In surface, climate, and products, it resembles many of the other provinces. The population is estimated at about 95,000. Kooba, the capital, and the only town of the province, contains about 700 wretched houses, built in an irregular manner.

All the above-mentioned provinces are governed by Russian military commanders. The following are less closely connected with Russia:—

Mingrelia.—This principality, which extends along the banks of the Rion, or Phasis, was well known in antiquity under the name of Colchis. It lies between 42° and 43° N. lat., and 41° 19′ and

42° 19′ E. long. The soil, climate, and productions are the same as those of Imiretia. The population amounts to 90,000, and consists of Mingrelians and Souanets, with a few Abkhasians, Armenians, and Jews. The Mingrelians speak a dialect of the Georgian language, and profess the Greek religion. The country is divided into three districts, called Sennakh, Legchoom, and Zoogdeet, and the territory of the Souanets. The chief towns are Sennakh, Anaklia, and Redout-Kale.

The principality of *Gooria* lies between 41° 40′ and 42° 5′ N. lat. The country is very hilly, and covered with large forests, containing excellent timber for ship-building. The soil is exceedingly fertile. The population, which consists of Georgians and some Armenians, amounts to about 37,000. There are two districts, Ozoorget and Nagomar, with towns of the same names, and the Russian fortress of Poti.

On the shores of the Caspian are the small possessions of the Shamkhal of *Tarkoo*, with 40,000 inhabitants, and the towns of Tarkoo and Boornaya. Two other petty chiefs in that city are the Prince of the *Karakaydans*, with 70,000 subjects; and the Cadee of *Tabasseran*, with 50,000.

Lesghistan, or the country of the Lesghis.—The Lesghis inhabit a country situated between Daghestan, Georgia, the Caucasus, and the provinces last acquired from Persia. The whole surface of their country is calculated to amount to 20,000 square versts. The Lesghis are a hardy, rude, and semi-civilised race. Most of them are Mohammedans. They consist of various tribes, of whom the chief are the Avars, the Kazeekoomooks, the Djaro-Belakans, and the Koobichees. There are also the highland tribes of the Mitsdjegi or Kistes. This portion of the Georgian region has been always difficult for the Russians to keep under any kind of subjection.

The *Ossetes*, who inhabit a large tract of the Caucasus, and constitute a population of about 33,000 families, are entirely distinct in language and physical constitution from the other Caucasian tribes. Klaproth thinks that they are descendants of a Median colony, settled there at a very remote epoch. A great part of this nation, occupying the southern slope of the Caucasus, was reduced to subjection by the monarchs of Georgia. They profess the Christian religion of the Greek church. They are a very laborious and sober nation. They are chiefly occupied in hunting and in rearing flocks, the produce of which they exchange for different objects of necessity. Besides these occupations they engage in predatory expeditions whenever a fair opportunity presents itself of doing so with impunity.

The *Abases*, or Abkhases, occupy Abasia Proper, which extends from Mingrelia along the shores of the Black Sea, a distance of nearly 70 English miles, and contains a population of about 50,000, under the nominal dominion of a prince who acknowledges the supremacy of Russia. The ruins of many churches, which are still held in great veneration by the natives, prove that the Christian religion was once established in this country: the exercise of it however seems to have been dropped among the Abasians many centuries ago.

GEORGIA, one of the United States of North America, extends from north to south between 30° 30′ and 35° N. lat., and from east to west between 80° 50′ and 85° 40′ W. long. It is bounded N. by Tennessee and North Carolina, N.E. by South Carolina, E. by the Atlantic Ocean, S. by Florida, and W. by Alabama. Its length, N. to S., is 300 miles; its greatest breadth is 280 miles. The area is 58,000 square miles. The population in 1840 was 691,392, of whom 280,944 were slaves.

The line of coast, extending 105 miles in a straight line, runs from S.S.W. to N.N.E., with a slight bend westward. It is very irregularly indented, and skirted by numerous low islands, the principal of which are Tybee, Ossabow, St. Catherine's, Sapello, St. Simons, and Cumberland. These islands, as well as some tracts on the adjacent shore, have a light rich soil, well adapted for the culture of cotton. The cotton grown here, known by the name of Sea-Island Cotton, fetches a higher price in the market than any other. The inlets and sounds which divide the islands from one another, and penetrate several miles inland, are generally very shallow, and admit only vessels of less than 100 tons. Vessels of larger dimensions can enter only three harbours, St. Mary's, Alatamaha, and Savannah.

The surface of Georgia is naturally divided into two regions, a plain and a hilly country. The plain is a dead flat along the shores of the ocean, with a sandy soil. In many places it is intersected with swamps. The largest of these swamps is the Okefinoke Swamp, near the boundary of and partly within Florida, which is about 50 miles in length and 30 in breadth. This swampy tract ceases about 50 or 60 miles from the sea, except the Okefinoke Swamp, which lies farther inland. West of the swampy tract the soil is dry; but, being commonly destitute of water, it is nearly unfit for cultivation, except along the bottoms of the rivers. The hilly region, which occupies nearly the northern half of the state, contains a much greater portion of arable land. The best land is along the rivers. The declivities of the hills also contain large tracts of cultivable land, but their dry and sandy summits do not admit of cultivation, and are covered with pines. The most southern ridges of the Appalachian Mountains occur along the northern boundary-line of Georgia, but they probably nowhere exceed the height of 1500 feet above the level of the sea.

The rivers which drain Georgia fall partly into the Gulf of Mexico and partly into the Atlantic. The Etowah River, a branch of the Coosa, is one of the principal branches of the Alabama. The Etowah runs about 80 miles within Georgia. The Appalachicola has two principal branches, the Chattahoochee and Flint rivers, which meet at the extreme south-western angle of this State, and then take the name of Appalachicola. The Chattahoochee rises between the most southern spurs of the Appalachian range, and runs S.W. for about 200 miles, and then S., forming for about 190 miles the boundary between Georgia and Alabama and Florida, till it joins the Flint River. The Flint River rises in the western districts of

the hilly region, between 33° and 34° N. lat., and flows S., and then W., till it joins the Chattahoochee. Its whole course is about 210 miles. St. Mary's River rises partly in Okefinoke Swamp, and partly north of it. It flows first S., then E., afterwards N., and again E., and enters the sea between Amelia and Cumberland islands, after a course of 110 miles. The Alatamaha runs through the central districts of Georgia; it is formed, near 30° N. lat., by the rivers Ocmulgee and Oconee, which unite, and form the Alatamaha, which flows E. and then S.E. till it empties itself in the ocean between St. Simons and Sapello islands. Its course is about 90 miles. The Savannah rises on the most southern declivity of the Appalachian range, and runs S.S.E. in all its course of 250 miles, forming in all this distance the boundary between Georgia and South Carolina. It is navigable for large vessels to the city of Savannah, and for vessels of 70 tons to Augusta.

The hilly region of Georgia is rather cold in winter. The plain approaches in its temperature the tropical regions of the globe. The thermometer in summer sometimes rises to 98° or 100°. In winter the thermometer ranges between 60° and 40°, and sinks occasionally lower. The weather however is then dry and constant.

In the southern districts the temperature is suitable to the sugar-cane, orange, olive, fig, pomegranate, &c. The chief products are cotton and rice, of which large quantities are exported, but tobacco, as well as Indian corn, wheat, and other kinds of grain are also grown. The hilly region resembles, in climate as well as in products, the countries of Middle Europe, and much of it is covered with pines, and some of it with oak, hickory, cedar, and other trees.

Bears and deer are very numerous in the forests and near the swamps. Alligators frequent the Alatamaha and other rivers.

Iron and copper occur in several places in the hilly country, and the ore is said to be rich. Gold is found in the northern part of the state in considerable quantity.

The whole population of Georgia is now composed of Europeans and Africans, or their descendants. Not a trace remains of the old Indian population.

The agricultural produce of Upper Georgia is not exported, except a small quantity of tobacco and live stock. The agricultural produce of Lower Georgia consists principally of cotton, rice, sugar, and indigo, all of which form articles of export. The imports into this state consist principally of manufactured goods. In 1843 the exports amounted to 4,522,401 dollars, and the imports to 207,432 dollars.

In 1845 there were in Georgia—the Central Railroad from Savannah to Macon, 192 miles; the Georgia Railroad, from Augusta to Atlanta, 170 miles; and the Western and Atlantic Railroad, from Atlanta to Dawsonville, 80 miles, which was to be continued in 1846 to Cross Plains, 22 miles, in which year the Macon and Atlanta Railroad was to be completed, 101 miles.

The state of Georgia is divided into 93 counties. The following are the principal towns, with the population of each in 1840:—*Augusta* is situated on the south-west bank of the river Savannah, 120 miles N.W. from the city of Savannah. The streets cross each other at right angles, and are ornamented with trees. It has a city-hall, court-house, gaol, theatre, arsenal, hospital, and 6 churches. It is connected by railroad with Charleston and Milledgeville. It has an active trade, and sends much cotton and other produce down the river to Savannah. Population, 6043. *Columbus* is situated on the eastern bank of the Chattahoochee, 175 miles above the junction with the Flint River, and at the head of the steam-boat navigation. Upwards of 30 steam-boats ply on the river. It contains a court-house, gaol, market-house, and 5 churches. Population, 3114. In 1844 the population had increased to about 7000. *Darien*, situated on the north bank of the Alatamaha, about 12 miles from the mouth. It has a good trade in cotton. Population about 3000. *Macon* is situated on the west bank of the Ocmulgee, at the head of the steam-boat navigation. It has a court-house, gaol, market-house, and 5 churches. Much cotton is shipped from Macon. Population, 3927. *Milledgeville*, the capital of the state of Georgia, is situated on the west bank of the Oconee, at the head of the steam-boat navigation, 158 miles N.W. from Savannah. It has a state-house, representatives' hall, a state-arsenal, and other public buildings. Population, 2095. *Savannah*, a city and port of entry, is situated on the south-west bank of the river Savannah, 17 miles from its mouth, in 32° 8′ N. lat., 81° 10′ W. long. The city is built on a sandy plain about 40 feet above the level of the tide. The streets cross each other at right angles, and many of them are wide and bordered with trees. The city contains a city-hall, court-house, hospital, theatre, and 13 churches. The harbour is good. Vessels drawing 14 feet of water can come up to the wharfs, and larger vessels to Fathom Hole, 4 miles below. About 20 steam-boats of large size and 50 steam tow-boats navigate the river. Much of the trade of Georgia passes through Savannah. The principal articles of export are cotton and rice. Population, in 1830, 7776; in 1840, 11,214, of whom 4694 were slaves.

The colony of Georgia was founded in 1732 by a private company, and received its name in honour of King George II. In 1733 General Oglethorpe founded the town of Savannah. The present constitution was formed in 1798. The legislative body is composed of a senate and a house of representatives. The senators, 47 in number, and the members of the house of representatives, 130 in number, are elected annually. Every free white male citizen twenty years of age, and paying taxes, has a vote in the election of the members of both houses. The governor is elected by the people for the term of two years. The state sends 2 senators and 8 representatives to Congress.

(Haskel and Smith, *United States' Gazetteer; American Almanac*, 1847.)

GEORGIUM SIDUS. [URANUS.]

GEOSAURUS, Cuvier's name for a sub-genus of Saurians, found in a fossil state only, and

considered by him as intermediate between the *Crocodiles* and the *Monitors*.

This extinct animal is the *Geosaurus* of Cuvier's 'Ossemens Fossiles.' Cuvier's name, *Geosaurus*, was given, to use Cuvier's own words, 'par allusion à Terre, mère des Géans'—by an allusion to Earth—Ge (Γῆ) of the Greeks, the fabled mother of the Giants. Immediately after the allusion to the origin of the name, Cuvier says, 'I cannot retain for it the epithet gigantic; for, in the great genus *Lacerta* we have already the animal of Maastricht, or *Mosasaurus*, which greatly surpassed it, and there is also another (the *Megalosaurus*) which is very superior in size.'

The remains upon which Cuvier founded his sub-genus were found in the canton Meulenhardt, at the depth of ten feet, and a few paces from the crocodile described by Cuvier (Gavial of Mannheim and of Boll; 'Oss. Foss.,' tom. v. pp. 120–125: *Crocodilus priscus* of Sömmering; *Ælodon priscus* of Herrmann von Meyer), by the labourers employed to work the mines of granular iron which fills the fissures of the strata of calcareous schist.

Sömmering, to whom the Count of Reysach gave these 'precious fragments,' to use Cuvier's expression (for, in consequence of the nature of the bed in which they were discovered they were not well preserved), published an accurate account of them in the 'Memoirs of Munich' for 1816, accompanied by a lithographic illustration, which Cuvier reduced, and published in his 'Ossemens Fossiles.' Sömmering however thought that the bones belonged to a young individual of the Maastricht animal (*Mosasaurus*).

The bones were nearly calcined. Near the remains of the Saurian were a flat ammonite four inches in width, a fragment of blueish shell, and a great quantity of small scales, which, according to Sömmering's conjecture, belonged either to fishes, or perhaps to the animal itself if it was a Monitor, or some other lizard with small scales.

Our limits will not allow us to point out the differences between *Geosaurus* and *Mosasaurus*, excepting that they are to be found principally in the teeth and in the vertebræ.

GERA. [Reuss.]

GERANIA'CEÆ, a natural order of Exogens. In many respects they are allied to *Malvaceæ*. These plants are usually astringent and odoriferous, their smell varying from a disagreeable hircine character to that of great sweetness. The maximum of the order occurs at the Cape of Good Hope under the form of the genus *Pelargonium*, hundreds of beautiful varieties of which are now favourite objects of cultivation in gardens: these are chiefly bushes. Those species of the order which inhabit Europe are herbaceous plants; a few are handsome enough to be cultivated, but the major part consists of mere weeds. The flowers of the whole order are usually of some tint of purple; it is therefore remarkable that a few species should exist in which the colour is a pure bright yellow, as in *Geranium chrysanthum*, a native of the south of Europe.

GERA'NIUM, a genus of plants, the type of the natural order *Geraniaceæ*. *G. Robertianum* has small bright crimson flowers, and is found on waste ground, walls, and banks, in Great Britain, in Brazil, and Chile. The whole herb has a strong disagreeable smell. It contains tannin, and has an astringent action on the system. *G. maculatum*, Spotted Crane's-Bill, is a native of North America, from Canada to North Carolina. The flowers are of a pale lilac colour. On account of the astringent nature of this plant, it is known in some parts of North America as Alum-Root, and is employed successfully as a remedy in dysentery among children, a disease very prevalent in the parts of the country where it grows.

GERARD, a celebrated translator of the middle ages, was born at Cremona, in Lombardy, in 1114. He early applied himself to philosophical studies; but, as they were in a very low condition at that time amongst the Western Christians, he went to Spain, where learning was in a flourishing state amongst the Arabs. He there became thoroughly acquainted with the Arabic, and applied himself particularly to the translation of different works from that language into Latin. Gerard returned to his native town, where he died in 1187, at the age of 73.

GE'RARD, FRANÇOIS, BARON, one of the most distinguished painters of France, was born of a French father and Italian mother at Rome in 1770. He went early to Paris, and was first placed with the sculptor Pajou, and finally with David, as he found painting better suited to his taste than sculpture. Gérard's first production of note was the blind Belisarius carrying his dying guide in his arms, painted in 1795; it is now in the Leuchtenberg Gallery at Munich, and is well known in prints.

Some of his works are among the best and largest oil paintings in existence. Among these, his entrance of Henry IV. into Paris is his masterpiece. This was painted in 1817 for Louis XVIII., and it procured Gérard his title of Baron.

Of his small pictures, the best is perhaps Thetis bearing the armour of Achilles, painted in 1822, and which is in the highest degree admirable. A list of Gérard's portraits (unsurpassed in his own time) would almost amount to a list of the most illustrious personages of his age. Gérard died Jan. 11, 1837.

GERARDE, JOHN, a famous herbalist of the time of Queen Elizabeth, was born at Nantwich in Cheshire, in the year 1545, and was educated as a surgeon. He removed to London, where he obtained the patronage of Lord Burghley, who was himself a lover of plants, and had the best collection in his garden of any nobleman in the kingdom. Gerarde had the superintendence of this fine garden, and retained his employment, as he tells us himself, for twenty years.

His London residence was in Holborn, where also he had a large physic garden of his own, which was probably the first of its kind in England for the number and variety of its productions.

The earliest publication of Gerarde was the catalogue of his own garden in Holborn. A copy of the first edition (of extreme rarity) is preserved in the library of the British Museum, where it

proved of great use to Mr. Aiton in preparing his 'Hortus Kewensis,' by enabling him to ascertain the time when many old plants were first cultivated. In 1597 came out his 'Herbal, or General History of Plants,' printed by John Norton, folio. A second edition of Gerarde's 'Herbal' was published by Dr. Thomas Johnson, with emendations and corrections, fol., Lond., 1633; and this work continued to be one of the best sources of botanical intelligence, at least to the beginning of the 18th century.

Gerarde died about the year 1607.

GERARDMER. [Vosges.]

GERBERT, afterwards Pope Sylvester II., was born of poor parents at Aurillac in Auvergne. The time of his birth does not appear to be known; he died in 1003, at a very advanced age. He commenced his studies in the monastery of St. Gerauld at Aurillac; he subsequently learned mathematics from a Spanish bishop, in Catalonia, and increased his knowledge during a journey to Rome, about 968. Otho I. conferred on him the abbey of Bobbio, where his fame as a teacher attracted students from all quarters. He next went to Germany (apparently on account of the unsettled state of Italy), and became tutor to young Otho, afterwards Otho II.; from thence he went to Reims, and became secretary to the archbishop, and master of the cathedral-school, which he made one of the first in Europe. In 992, Gerbert was made archbishop of Reims, but was deposed a few years afterwards. In 998 he was raised to the archbishopric of Ravenna by Otho III., and in 999 was elected to the pontifical chair, under the name of Sylvester II., which he lived to fill for nearly five years.

Gerbert was a man of great ability and of very extensive acquirements for his age. Geometry and astronomy were his favourite pursuits; there is or was extant a MS. treatise of his on sun-dials, and he also wrote on the astrolabe.

GERBIER D'OUVILLY, Sir BALTHASAR, a miniature painter and architect, born at Antwerp about 1591, was a retainer of the Duke of Buckingham's as early as 1613. He accompanied the duke to Spain, and painted a miniature of the Infanta for James I.; he was also employed in the treaty of marriage between Prince Charles and the Infanta Maria, though acting ostensibly only as a painter. He was employed also in Flanders, after the accession of Charles I., to negotiate a private treaty with Spain, the same treaty in which Rubens was commissioned on the part of the Infanta, and about which he came to England. In 1628 he was master of the ceremonies to King Charles, by whom he was knighted. He was also in favour with Charles II., and designed the triumphal arches for his reception on the Restoration. He died in 1667 at Hempsted-Marshall, the seat of Lord Craven, which was built by Gerbier himself.

Gerbier was the author of several curious works which are noticed at considerable length by Walpole. One of his daughters was maid of honour to the Princess Condé, and passed for her mistress when the Princess made her escape from Chantilly, when the Prince was imprisoned by Mazarin.

GERMAIN-EN-LAYE, ST., a town in France in the department of Seine-et-Oise, stands on the left bank of the Seine, 14 miles W. by N. from Paris by railroad, and has 13,618 inhabitants. It is situated on a height which commands a beautiful prospect of the valley of the Seine, with a distant view of Paris and its environs. The streets are handsome and well laid out, and the houses lofty and well built: there are many ancient mansions, once the residence of the lords of the court, before Louis XIV. forsook this place for Versailles. The château, or palace, which replaced a more ancient royal residence, and was built by François I., is built chiefly of brick, surrounded by wide and deep ditches; the apartments are handsome. Among its many historical associations must be mentioned that it was the residence of James II. of England, its last royal occupant. After his death in 1701 it was neglected till 1809, when Napoleon established in it a military school. In 1815 a body of 10,000 English were quartered in it. It afterwards served for a barrack for the royal guards. After the revolution of 1830 it was offered for sale, but found no bidders. It is now a military prison. The Château-Neuf, built by Henri IV. for his mistress Gabrielle d'Estrées, is now a heap of ruins. The forest or park of St. Germain, surrounded by walls, and occupying more than 10,500 acres, is adorned by trees of immense size, and has numerous broad avenues. In the forest are several edifices erected at different periods by the kings of France. The most remarkable of these is the structure called Les Loges, formerly a monastery, now an orphan school, in which 220 orphans, daughters of members of the legion of honour, are brought up. The fair of Les Loges, held on the first Sunday after the 30th of August, and lasting three days, is one of the gayest in France; it is attended by great numbers of country people and Parisians. The manufactures consist of cotton, hosiery, crinoline, and leather.

GERMAN-BANATE. [Military Frontier.]

GERMAN OCEAN. [North Sea.]

GERMAN SILVER. [Copper.]

GERMA'NICUS, CÆSAR, the eldest son of Drusus Nero Germanicus and of Antonia the younger, the nephew of Tiberius, and brother of Claudius, afterwards emperor, was born in 14 B.C. Augustus, on adopting Tiberius, made Tiberius adopt his nephew Germanicus. At the age of twenty Germanicus served with distinction in Dalmatia and Pannonia, and on his return obtained a triumph. He married Agrippina the elder, grand-daughter of Augustus, by whom he had nine children; among others Caius Caligula, afterwards emperor, and Agrippina the younger, mother of the Emperor Nero. In A.D. 12 Germanicus was made consul, and soon after he was sent by Augustus to command the legions on the Rhine. On the news of the death of Augustus some of the legions on the lower Rhine mutinied, while Germanicus was absent collecting the revenue in Gaul; he hastened back to the camp, and found it a scene of tumult and confusion. With great difficulty he succeeded in restoring discipline. He found still greater difficulty in

quelling a second mutiny, which broke out on the arrival of legates from the senate, who brought to Germanicus his promotion to the rank of Proconsul. Availing himself of the present state of excitement of the soldiers, Germanicus crossed the Rhine, attacked the Bructeri, and other German tribes, and routed them with great slaughter. In the following year, taking advantage of a quarrel between Arminius, the conqueror of Varus, and Segestes, another German chief, he attacked Arminius, and penetrated to the spot where the legions of Varus had been cut to pieces. In the following campaign Germanicus embarked his troops on board a flotilla, and landed at the mouth of the Ems, from whence he marched towards the Visurgis, or Weser, where he found Arminius encamped. Two obstinate battles were fought in succession, in both of which Arminius was defeated. After this victory he sent part of his legions by land to their winter quarters on the Rhine, and with the rest embarked on the Ems, to return by sea; but his vessels were dispersed by a storm, many were lost, and he was cast on the coast of the Chauci, whence he returned to the Rhine and placed the legions in winter-quarters. Tiberius, who felt jealous of the glory of his nephew and of his popularity with the troops, obliged him to return to Rome, where he triumphed in the following year, A.D. 17. The year after, he was consul for the second time with Tiberius himself, and was sent to the East with extensive powers. But Tiberius took care to have a watch over him by placing in the government of Syria Cnæus Piso, a violent and ambitious man, who annoyed Germanicus in every possible way, and his wife Plancina seconded him in his purpose. The frank and open nature of Germanicus was not a match for the intrigues of his enemies. After making peace with Artabanus, king of the Parthians, and calming other disturbances in the East, Germanicus fell ill at Antioch, and after lingering some time he died, A.D. 19, plainly expressing to his wife and friends his conviction that he was the victim of the treason of Piso and Plancina; whether he meant through poison or through their annoyances is doubtful. His wife Agrippina, with her son Caius and her other children, returned to Rome with the ashes of her husband. [AGRIPPINA, the Elder.]

Germanicus was generally and deeply regretted. He died in the 34th year of his age. He is praised for his sincerity, his kind nature, his disinterestedness, and his love of information.

(Tacitus, *Annals*, lib. i. ii.; Dion Cassius, lib. 57.)

GERMANS, ST. [CORNWALL.]

GERMANY extends from 45° 5′ to 57° 50′ N. lat., and from 6° 20′ to 20° 10′ E. long. It is bounded on the west by Holland, Belgium, and France; on the south, by Switzerland and Austrian Italy; on the east, by Hungary, Galizia, Poland, and Prussia; and on the north, by the Baltic. Its area is 284,000 square miles, or about twice and a half the area of the British islands.

Surface.—Germany is divided into four distinctly marked districts, namely two plains and two mountain-regions. One of the plains is low, and rises only a little above the level of the sea; the other attains a considerable elevation. Between the two plains extends a mountain-region, whose summits in no part attain the snow-line, which in this parallel is calculated to be about 6000 feet above the sea-level. To the north of this region extends the low plain, and to the south of it the elevated plain, which on the east and west is inclosed by mountainous tracts belonging to that region. The southern boundary of the elevated plain is formed by the Alps, which constitute the fourth natural division of Germany.

The Low Plain.—This is only a small section of the great plain which extends nearly over the whole northern part of the old continent. This section occupies the northern portion of Germany, which lies on the southern shores of the North Sea and Baltic Sea, and extends to the peninsula of Jutland. Its length, from the boundary of the Netherlands and the Rhine to the borders of Russia, including the kingdom of Prussia, is nearly 600 miles; but its width varies, being, on the west of the Elbe, on an average about 160 miles, and to the east of the Elbe about 300 miles. This plain is generally very sterile. It is supposed to have been once covered by the sea. Its substratum is formed of limestone, chalk, gypsum, and sandstone, which are covered by loam, clay, and sand, to an average depth of 200 feet. Westward of the Elbe, the plain is almost without trees, and the cultivable ground occurs only in patches, like oases in a desert; the rivers run in depressions 100 to 200 feet below the level of the plain, and along the banks there are bottoms with fertile soil, and abundance of forest trees. A fertile tract lies in the middle of the plain, near Hanover, bounded on the north by the Süntel, and on the south by the Teutoburger Wald. The plain south of this fertile tract contains a larger proportion of arable soil than that northward of it. The plain eastward of the Elbe has a somewhat different character. Tracts covered with heath and moor occur here, not contiguous, but separated from each other by great intervals of sandy surface. These sandy tracts however are not destitute of vegetation, nearly all of them being covered by various kinds of pine, which give the soil a greater degree of solidity. Still all lands of this description are only cultivated in a comparatively few and favoured places, and the crops are very scanty; but this portion of the plain contains a greater number of fertile tracts, which in some places are of considerable extent. The bed of the rivers is less depressed below the level of the plain, and the rich lands along their banks have a greater width.

Through the northern part of this plain a higher tract may be traced, which in general runs west and east, but with two great bends. This forms the watershed between a great number of small rivers which fall into the Baltic, and many others which run off to the southward, and increase the waters of the Elbe, Oder, and Vistula. It is also remarkable for the immense number of small lakes which occur on its higher parts or near them. Some of these are lakes of considerable extent, as the Lake of Schwerin, near the western extremity, and the Lake of Spirding, towards the banks of the Niemen. On the northern side of

this high ground we find those numerous erratic blocks or boulders which have attracted the attention of geologists.

The Central Mountain Region.—This region is composed of many mountain groups; such as the Fichtelgebirge, the Forest of Bohemia, the Sudetsch Mountains, the Moravian Mountains, the Riesengebirge, the Lusatian Mountains, the Erzgebirge, the Frankenwald, the Thüringerwald, the Röngebirge, the Spessart, the Harz Mountains, the Egge Mountains, the Westerwald, the Siebengebirge, the Taunus range, the Oberwald, the Schwarzwald or Black Forest, and the Odenwald. These mountains form a connected chain, which bound the Low Plain on the south, and the High Plain on the east, north, and west. The sources of most of the principal German rivers are in these mountains. These mountain-systems are described in the 'National Cyclopædia,' either under their own names (Bohemia, Forest of; Erzgebirge; Fichtelgebirge, &c.), or under the names of the states in which they are situated (Baden; Bavaria; Bohemia, &c.).

The Elevated Plain.—This plain, which forms the table-land of Bavaria, extends between the Schwarzwald and Odenwald on the west to the Böhmerwald on the east, as far north as the Thüringerwald and Röngebirge. It is bounded on the south by the Alps. Its length from north to south is about 180 miles, and its mean breadth probably exceeds 120 miles. The general characters of this region are described under Bavaria.

The Southern Mountain Region.—Germany is bounded on the south by the rugged mountain-region of the Alps. [Alps; Austria.]

That part of Germany which lies on the left bank of the Rhine contains level tracts only along the river, the greater part of it being occupied by mountain-ranges which partly constitute the northern extremity of the Vosges Mountains, and partly the eastern districts of the Ardennes. The Vosges enter Germany as a broad-backed range, and descend rapidly towards the flat tract, which, with a mean breadth of eight or ten miles, separates them from the Rhine; they lower gradually towards the west, where they terminate in a flat level of moderate extent. Where the Vosges terminate commences a valley which extends from the Rhine to the Saar, 50 miles long by 4 wide. North of this valley lie the ridges of the Donnersberg, the Hochwald, the Idarwald, the Hundsrück, and the Eifel, which may be considered as a part of the Ardennes. The Eifel is a peculiar district. Its upper surface, which appears rather as a plain of a very rugged surface, on which several summits rise to some height, is partly covered with sand and swamps, and partly with pumice-stone and lava. There are numerous depressions, mostly filled with water, which have been recognised as extinct volcanoes. From one of these depressions, called the Lake of Laach (750 feet above the sea), a lava-tract extends five miles in length, and nearly three miles in width, to the small river Nette.

The rivers, minerals, soil, productions, and climate of Germany are described under the names of the states which compose it.

History.—The word Germania was employed by the Romans to designate a country of greater extent than modern Germany. They included under this name all the nations of Europe east of the Rhine and North of the Danube, bounded on the north by the German Ocean and the Baltic, including Denmark and the neighbouring islands, and on the east by the Sarmatians and Dacians. The Greeks and Romans had very little knowledge of Germany before the time of Julius Cæsar, who met with several German tribes in Gaul, and crossed the Rhine more than once, rather with the view of preventing their incursions into Gaul than of making any permanent conquests; but at no time had the Romans much knowledge of the country eastward of the Visurgis (Weser).

The name of Germani was first applied by Cæsar to the whole nation east of the Rhine, though it properly belonged only to those tribes which he conquered in Gaul. Tacitus states ('Germ.,' c. 2) that the first tribe which crossed the Rhine were the Tungri, who were afterwards called Germani, which is supposed to be the same as Wehrmann, that is, 'man of war.' It is doubtful whether the Germans themselves employed any one name to designate the whole nation. Tacitus ('Germ.,' c. 2) divides them into three tribes; Pliny ('Nat. Hist.,' iv. 14) into eighteen; while later researches have still further increased the number.

The origin of the Germanic nations, like that of all others, is uncertain. Some authors, taking as their guide the affinity of languages, have traced their descent from the inhabitants of Asia; and Von Hammer calls them a Bactriano-Median nation. It is now indisputably established that the Teutonic dialects belong to one great family with the Latin, the Greek, the Sanscrit, and other European and Asiatic tongues. All the positive knowledge however that we have of the German nations previous to their contact with the Romans is exceedingly vague and mere conjecture.

After the occasional encounters which the Romans had with the barbarous tribes of Germany, the civil commotions which distracted the Romans themselves withdrew their attention for some time from Germany, and the Sigambri ravaged Gallia with impunity. After they had defeated Lollius, the legate of the Emperor Augustus (B.C. 15), he himself hastened to the defence of Gallia (Vell. Pat., ii. 97); and, in order to oppose the inroads of the Germans, he erected several fortresses on the Rhine, and gave his stepson Drusus the command of the forces stationed on the banks of that river. Drusus made several successful expeditions against the Germanic nations, and penetrated as far as the Elbe. After the death of Drusus (B.C. 9), the bad management of some of the Roman generals caused them to lose all their acquired possessions in Germany, while the Germans were themselves too much disturbed by internal discord to attack the Romans for many years. They however recommenced their inroads under Domitian, Nerva, and Trajan, the last of whom entirely defeated them. From this time their attacks on the Roman empire became more frequent and more formidable, and their history becomes blended

with that of the decline of the Roman empire, on the ruins of which they established several new states. We shall pass over the period to the death of Charlemagne, under whose successors the modern history of Germany begins.

Louis, surnamed the Germanic, son of Louis Le Débonnair, and grandson of Charlemagne, was by the Treaty of Verdun, 843, the first king of the Germans. Germany was divided at that time from France by the Rhine, and possessed on its left bank only Spires, Worms, and Mainz, with their respective districts. Under the reign of Louis were established the margraves; and burgs, that is, fortified towns or castles, were founded in order to prevent the inroads of the Normans as well as of the Sclavonians. This emperor increased his dominions by the acquisition of Cologne, Treves, Aix-la-Chapelle, Utrecht, Metz, Strasburg, Basel, and many other towns. He was succeeded by the following emperors, the dates being those of accession:—

Carloman	876
Charles the Fat	884
Arnulph	896
Louis	899

The Carlovingian dynasty ended with the last-named monarch, after whose death the crown became elective, and remained so for nine centuries.

Conrad	911
Henry the Fowler	918
Otho I.	936
Otho II.	973
Otho III.	983
Henry II.	1002
Conrad II.	1024
Henry III.	1039
Henry IV.	1056
Henry V.	1106
Lotharius II.	1125

During these eleven reigns the Emperors of Germany assumed the title of Roman Emperor; the feudal system became organised; the great vassals of the Empire became entirely independent; and the contest between the Popes and the Emperors commenced.

Conrad III.	1137
Frederick I.	1152
Henry VI.	1190
Philip	1197
Otho IV.	1208
Frederick II.	1215
Conrad IV.	1250
Rudolph I.	1272

Under Conrad III. the influence of the clergy greatly increased in Germany. Frederick I. (Barbarossa) was constantly at war with the Popes; and in his reign the Hanseatic League was established. After the death of Henry VI., and again after that of Conrad IV., great disputes arose between contending claimants for the crown. Rudolph I., who founded the dynasty of Hapsburg, greatly curbed the ambition of the nobles.

Adolphus	1291
Albert I.	1298
Henry VII.	1308
Louis of Bavaria	1314
Charles IV.	1347
Wenceslaus	1378
Sigismund	1410
Albert II.	1437
Frederick	1439

Albert I. lost Switzerland, which formed its confederation during his reign. The next three Emperors were frequently at war with the Popes. The Hussite persecutions took place during the reign of Sigismund.

Maximilian I.	1493
Charles V.	1519
Ferdinand I.	1556
Maximilian II.	1564
Rudolph II.	1576
Matthias	1612
Ferdinand II.	1619
Ferdinand III.	1637

Various chequered fortunes attended the Emperors during this period of a century and a half; such as the rise of Luther and the Reformation; the connection with Spain under Charles V.; the Thirty Years' War (1618 to 1648); and the Treaty of Westphalia, which terminated this war. By this treaty, which served as the basis of the constitution of Germany till the formation of the Confederation of the Rhine in 1806, the religious and political liberties of the Germans were established on a sure footing. The sovereignty of the states of the empire was acknowledged, as well as their right to form alliances among themselves and with foreign states, provided none were concluded against the emperor or the empire. It was also declared that the emperor should not, without the consent of the states, put any one of them under the ban of the empire. Several bishoprics and abbeys were secularised, and given as an indemnity to different states. All the sovereigns were put under an obligation not to persecute their subjects who professed a religion different from their own. Various privileges and sovereignties were ceded to the minor states; and Austria consented to all these measures in order to preserve her hereditary states.

Leopold I.	1657
Joseph I.	1705
Charles VI.	1411
Maria Theresa	1740
Charles VII.	1742
Francis I.	1745
Joseph II.	1765
Leopold II.	1790
Francis II.	1790

From the middle of the 17th century to nearly the middle of the 18th century, the Emperors were generally at war, either with the Turks or the French. Leopold I. raised the elector of Brandenburg to the rank of King of Prussia, in 1701. Consequent on the failure of the male line of the house of Hapsburg (1740), there arose two successive wars between contending and rival powers: one which lasted from 1742 to 1748; and the other (the Seven Years' War) from 1756 to 1763. The remainder of the century was not marked by many important occurrences until the breaking out of the French Revolution.

Language and Literature.—The German language is divided into two great branches, which

are subdivided into several dialects: the *High German*, or language of southern Germany; and the *Low German*, or language of northern Germany. The High German was formerly divided into two dialects, the Francic and the Allemannic. The Francic was the idiom of the Franks and of the French court till the reign of Charles the Bald, when it was replaced by the French. The principal monuments of this dialect are, the fragments of a treatise of Isidore, 'De Nativitate Christi,' which date from the beginning of the eighth century, and a few other fragments. The Allemannic dialect prevailed in the south-western part of Germany, including a great part of Switzerland. Its existing monuments are two or three translations and paraphrases. Both the above-mentioned dialects seem to have disappeared in the middle ages and to have been replaced by the Suabian dialect, which became the language of the court under the Hohenstauffen dynasty, and in which the Minnesingers composed their poems.

The modern German, also called High German (Hoch Deutsch), may be considered as chiefly derived from the old High German, or southern dialect. Its universal usage as the literary language of all Germany dates from Luther's translation of the Bible, by which circumstance it acquired a decided superiority over all the dialects of Germany. The spoken language is divided into many different dialects.

The Low German, or Saxon, may be divided into the Old Saxon, the Low German of the middle ages, and the modern Low German. The first of these three prevailed from the eighth to the eleventh centuries; the second, from the eleventh to the sixteenth; while the third is the spoken (but not the written) language over great part of the north of Germany, and is itself subdivided into many dialects. The chief literary work in the Old Saxon is the 'Evangelien Harmony;' and in the Low German of the middle ages 'Reineke Fuchs.' The Frisian language is also a branch of the German.

The most ancient monument of German literature extant is the translation of the Bible into the Gothic language by Bishop Ulphilas, A.D. 360. But the reign of Charlemagne may be considered as the commencement of German literature, although there are some fragments of translations from ecclesiastical books which were probably made prior to that epoch. Charlemagne, who was very anxious to promote the cultivation of his native language, introduced German names of months. He ordered the scattered monuments of the Teutonic language, particularly laws or customs, and songs, to be collected. The two most ancient German poems are, the 'Lay of Hildebrand and Hadubrand,' and the 'Prayer of Weiszenbrun,' which have been published by Grimm, and which belong to the eighth century. After this reign, the Christian religion being established throughout all Germany, many fragments of the Bible and some ecclesiastical writings were paraphrased from the Latin into the vulgar tongue. Fragments of very curious poems have been preserved, belonging to the ninth and two following centuries.

The reign of the emperors of the Suabian family of Hohenstauffen is the golden age of the romantic or chivalrous poetry of Germany. This poetry being written in the Suabian dialect, which came into fashion through the influence of the reigning family, is generally called the Suabian. The poets of that period are known under the name of Minnesingers, from the old German word *minne*, which signifies 'love.' They may be compared in many respects with the Troubadours of Provence, and were generally knights and nobles, whose life was divided between the occupations of love, war and devotion, which inspired their poetical effusions with tender, noble, and pious feelings. The most ancient Minnesinger whose works have reached us is Henry von Veldek; next to him the most celebrated are Walter von der Vogelweyde, Reimar the Old, Reimar von Zweter, Ulrich von Lichtenstein, Wolfram von Eschenbach, Hartman von der Aue, and some others, who all lived either at the end of the twelfth or at the beginning of the thirteenth century. The last of these poets who deserve notice are John of Würzberg and John Hadloup, who both lived at the end of the thirteenth century.

The most remarkable production of that time is the celebrated 'Nibelungen Lied,' which is quite different from the poems of the Minnesingers, and whose origin is by many ascribed to a much more remote period. It is a kind of epic poem, of which the chief heroes are Attila, or Etzel, king of the Huns, and Dietrich, or Theodoric of Berne, king of the Goths.

The cultivation of poetry by the burghers became a kind of trade, and the poets, who formed a corporation like other artisans and tradesmen were called Meistersingers, or master singers. They had their rules like other corporations, and the members were obliged to submit to an apprenticeship. The general subjects of the poems of this period are of a moral and satirical character, but there are also some of the didactic kind.

To this epoch belongs the commencement of the original dramatic literature of Germany, which is due to the meistersingers' school of Nürnberg. Before that period the Germans were only acquainted with the so-called mysteries or dramatised biblical stories, written and performed for the most part in Latin. About the middle of the 15th century, Hans Volz, a barber by profession, Rosenblut, and some others, introduced a kind of farce called 'Carnival Plays.' They were all excelled by Hans Sachs, a shoemaker by profession, who lived from 1494 to 1576: his works are full of wit and invention, and, next to the Spaniard Lope de Vega, he is the most fertile of dramatic writers.

Many historical and allegorical poems were written during the 15th century, and several ballads and other metrical productions were rendered into prose, which may be considered as the commencement of the novel in Germany. The names of Bishop Otho, Henry of Erfurt, Goblinus, Enenkel, Ottokor, Königshofen, Roth, Thurmayr, Kantzow, Detmar, Frank, Gross, Rudolph Agricola, Conrad Celtes, Reuchlin, Ulric von Hutten, and Camerarius, occur among the German writers of the 15th century.

The Reformation of Luther gave an extraordinary impulse to the national literature of Germany, and Luther himself contributed more than any other man to the advancement of the German language, which may be considered as having been fixed by his translation of the Scriptures. Among the poets we may mention Luther himself, who composed many religious songs, Rudolph Weckherlin, and, above all, Opitz. Among the principal followers of Opitz, who form the Silesian school, we may mention—Paul Flemming, 1609–40; Simeon Dach, 1605–59; A. Tcherning, 1611–59; Paul Gerhard, 1606–76; F. Van Logau, 1604–55; A. Gryphius, 1616–64; and John Rist, 1607–61.

Among the prose writers we must mention in the first place the mystical authors, or the so-called theosophists, who united the study of divinity and metaphysics with that of natural philosophy. The most celebrated are Paracelsus, Weigel, and Jacob Böhme. The historical writers were not numerous; the best among them were Puffendorf, Steidanus, and Conring. In science the names of Gesner, Otto Guericke, Kepler, Leibnitz, and Wolf occupy a distinguished place; while polite literature was greatly advanced by the writings of Gottsched, Gellert, Lessing, Gärtner, and Rabener.

In the first half of the seventeenth century, Opitz, regarded as the founder of the modern forms of German poetry, translated several tragedies from the ancients into verse, and composed operatic pastorals after the Italian manner; but it is not known whether he wrote anything expressly for the stage. Next came Andreas Gryphius, considered as the earliest dramatic writer of Germany. The plays of Gryphius are written after the French model in Alexandrines. The tragedies of Lohenstein, who wrote at the same time, are of such immeasurable length as clearly to have set all representation at defiance. The dramatic literature of Germany down to a late period in the 18th century was at a low ebb. Gottsched, Gellert, and other writers either wrote bad original plays or imitations of French ones.

Lessing wrote at the commencement of his career 'Miss Sara Sampson,' a tragedy in prose; but in 1767 his connection with a company of comedians at Hamburg, and a periodical paper devoted to theatrical criticism which he conducted, gave him occasion to enter more deeply into the consideration of dramatic art. The boldness and acuteness with which, through this medium, he attacked the prevalent French taste in tragedy were so successful, that in a short time not only the translations of French tragedies, but the German tragedies modelled after them, disappeared from the stage. He was the first who spoke warmly of Shakspere, and paved the way for his appearance in Germany. Lessing has himself been the subject of much criticism in later times; and his plays of 'Minna von Barnhelm,' 'Emilia Galotti,' 'Nathan the Wise,' &c., have been the theme of conflicting opinions; but all admit that he rendered great service to German dramatic literature.

As the leading object of Göthe seems to have been to give his genius the fullest possible expression in his works, so he was indifferent as to the form, though generally preferring the dramatic. He was at the same time a warm friend to the theatre, and sometimes laboured to comply with its wants as determined by custom and the taste of the day. The consequence of this has been, that there is a singular variety in the subjects and treatment of the plays written by this great writer.

Meanwhile, shortly after the first appearance of Göthe, a very vigorous effort had been made to bring Shakspere upon the German stage. The plays however had the disadvantage of appearing in cumbersome prose translations, and often in mere abstracts, with disfiguring alterations: the separate characters and situations had been to a certain degree hit, but by no means the sense of his composition.

Under these circumstances appeared Schiller, endowed with the qualities requisite for producing a strong effect on the multitude as well as on minds of a higher cultivation. Though his genius was daring in the highest degree, yet in the works of his youth he was influenced by the models of Lessing, by the earlier productions of Göthe, and by Shakspere, so far as he could understand him without an acquaintance with the original. At a later date he sought his materials more completely from within. His 'Robbers,' 'Don Carlos,' 'Wallenstein,' 'Maria Stuart,' 'Maid of Orleans,' 'Bride of Messina,' and 'Wilhelm Tell' form collectively a monument of dramatic skill. How much farther Schiller might have carried the advancement of the German drama it is difficult to estimate, as he now devoted himself exclusively to the theatre, attained with every fresh work a higher mastery in his art, and was carried off by an untimely death in the full maturity of his mind.

We shall here briefly enumerate, in alphabetical order, the principal poets who have appeared in Germany since the middle of the last century.

Charles Gustave Brinkmann (1764). Poems of great purity and harmony of language.

Bürger, the well-known author of 'Leonora' and other ballads. [Bürger.]

Claudius Matthias (1743–1815), a writer of numerous popular songs, elegies, and fables.

John Andrew Cramer (1723–1788). Hymns and religious odes.

Michael Denis (1719–1800). Translator and imitator of Ossian.

Gessner. [Gessner, Solomon.]

J. W. L. Gleim (1719–1803). Fables, tales, epigrams, and songs for children.

Göcking (1748–1828). Songs, allegorical poems, and epistles, but his reputation was chiefly established by the 'Songs of two Lovers.'

Göthe. [Göthe.]

Gotter (1746–97). Tragedies, comedies, operas, epistles, tales, songs, &c.

J. N. Götz (1721–81). Odes, elegies, idylls, or eclogues, tales, and allegorical poems.

Frederick Hagedorn (1708–54). Fables, tales, merry songs, and several minor poems.

Haller, the celebrated physician and naturalist, wrote also many elegiac and didactic poems.

Herder. [Herder.]

Hippel (1741–1796) is considered one of the first of the humorous poets of Germany.

Hölty (1748–76). His poems, particularly his idylls and elegies, are very popular.

Kästner, a celebrated mathematician (1719–1800), was also known by his witty epigrams.

Ewald Kliest (1731–1759). 'Spring,' and other poems.

Klopstock. [KLOPSTOCK.]

Kosegarten (1758–1818). Besides some novels, he wrote many poems belonging to the so-called romantic school, which have attained considerable reputation in Germany.

Kotzebue. [KOTZEBUE.]

Lichtwer (1719–83), a popular writer of fables.

Mathisson (1761–1831), a lyric poet of considerable popularity, whose works are however more distinguished by skilful versification than by poetical genius.

Friedrich Müller (1750–1825). Besides some dramatic productions, he wrote chiefly elegies.

Neubeck, a didactic poet, established his reputation by his poem entitled 'Mineral Wealth,' written in hexameters.

Baron Nicolay (1737–1820) wrote fables, tales, elegies, epistles, and ballads, as well as some dramatic pieces, which were favourably received.

G. K. Pfeffel (1736–1809) wrote numerous fables and tales, which attained some popularity.

Rammler (1725–98), a lyric poet, translator, and critical author.

Schiller. [SCHILLER.]

Christian Count Stolberg (1748—1821) wrote several dramatic pieces, and translated into German several of the Greek poets. He was particularly successful in the expression of tender feelings, and in painting domestic scenes. His younger brother, Count Friedrich Leopold (1750–1819), who far excelled him in poetical talent, is known as a poet by his odes, hymns, elegies, ballads, satires, and dramatic compositions.

Thümmel (1738–1817) gained a reputation by 'Wilhelmina, or the Married Pedant,' which, though written in prose, is essentially a mock-heroic poem.

Uz (1720–96) wrote various poems of different kinds; but his epistles, his humorous poems, and hymns are his best productions.

Voss. [VOSS.]

Wieland. [WIELAND.]

Zachariä (1726–77) is one of the best comic poets of Germany, whose works are still held in high estimation.

A rapid glance may now be taken of the prose writers of Germany, since the middle of the last century.

Translations of the English 'Universal History,' and of the 'Universal History' of Guthrie and Gray were published in Germany in the last century; but with much original matter by German writers. Various compendiums of universal history were written by Schrökh, Remer, Beck, Busch, Bredow, and Hegewisch. Eichhorn, Heeren, Raumer, Wachsmuth, Menzel, Rotteck, Dippold, and Schlosser are distinguished names among the German historical writers of the present century.

The special history of several nations and countries has been treated in Germany of late years with a degree of research, patient industry, and sound judgment, in which the Germans have surpassed all the rest of their European contemporaries. To this class belong Maylath's 'History of Austria,' and that of Hungary. Lappenberg's 'History of England' shows an uncommon acquaintance with the historical sources of the Saxon period of our history. Von Hammer has written a history of the Turks, founded on Oriental authorities; Geijer, of Sweden; Kampen, of the Low Countries; Raumer, the history of the Hohenstauffen dynasty; Luden, Menzel, and Pfister, each a history of the Germans; Voigt, a history of Prussia; and Wilken, a history of the Crusades. Ranke is one of the most distinguished living historical writers; and the names of Niebuhr, Von Hammer, and K. O. Müller connect the present with the past, in German historical writing.

The Germans have produced many valuable works on the history of the human mind, on the progressive civilisation of the human race, and on the history of literature and art. Adelung's 'Essay on the History of the Civilisation of Mankind,' is a work of considerable merit, but is surpassed by Herder's 'Ideas on the Philosophy of the History of Mankind.' Jenist, Eichhorn, Waltman, Stapfer, Pölitz, Schneller, Meiners, Bouterwek, Meusel, and Wachler wrote also on these subjects. The two Schlegels occupy a distinguished rank as critics. Ecclesiastical history has engaged the pens of Mosheim, Schrökh, Tzchirner, Neander, Rhode, Münter, and others. The history of philosophy is treated in the compendiums of Eberhard, Gurlitt, and Socher; and in the extensive works of Tiedemann, Buhle, Tennemann, and H. Ritter. Fischer wrote a history of natural philosophy; Gmelin, of chemistry; Hoyer, of the military science; and Stäudlin, of the theological sciences. But the 'History of Medicine,' by Sprengel, is probably superior in real merit to any other work of the kind.

Geographical science has been most successfully cultivated in Germany: indeed we may say that Germany is its birthplace. Cellarius, Mannert, Ukert, Sprengel, Bischoff, and Möller were voluminous geographical writers. Modern geography was for the first time treated on something like a system by Büsching, whose 'Universal Geography,' in 10 parts, 1754–92, was long considered a standard work. The most distinguished writers on these subjects since Büsching have been Schütz, Ritter, Berghaus, Hassel, Schorch, Erman, Jäger, and Humboldt. Many of the geographical writers have also been able statisticians.

Germany has produced many eminent writers on every branch of jurisprudence. The predominant school in that country is now the historical, which is divided into the Teutonic, chiefly represented by Fr. Ch. Eichhorn; and the Roman, whose principal leader was Gustavus Hugo, professor at Göttingen, the author of many valuable works on Roman law. Savigny, Thibaut, Gans, Feuerbach, Konopach, Mittermaier, Puchta, Vangerow, and Kleinschrod are profound jurists.

The Protestant divines of Germany may be divided into three schools: 1, the Orthodox or Supernatural; 2, the Rational; and 3, the Pietist. The Orthodox theologians include Tholuck, Hengstenberg, Guericke, Hahn, Harms, Olshausen, Sartorius, Steudel, Schwartz, and Zöllick. The Rationalists include the writings of Rohr, Wegsheider, Paulus, Gesenius, Shalthesr, Baumgarten Crusius, David Schütz, Ammon, Böhme, Hase, Köster, and Strauss. The Pietists are only distinguished from the orthodox by a more strict adherence to religious observances, and greater zeal in all their views of promoting religion. Their views are advocated in several religious periodicals, and the most celebrated author of that party is Jung Stilling. Madame Krudener was a great promoter of the same party. In connection with theology, the Germans have prosecuted with unwearied industry the study of the Hebrew, the Arabic, and other Oriental languages. It is sufficient here to mention the names of Bopp, A. W. Schlegel, Rosen, Bohlen, and Lassen.

In pure philosophy the names of Kant, Fichte, Schelling, Hegel, and many others reflect a lustre on their native land. German metaphysics however will scarcely find a numerous class of readers in any other country; and this, mainly owing to two causes: first, the difficulty of mastering the language so as to understand these writers; and, secondly, the great extent of their works, which, as they are parts of a system, require to be studied completely.

GERMEN, a name applied by the Linnæan school of botanists to what is now called the ovary of a flower.

GERMINATION, the first growth of a seed, the act by which it exchanges the condition of an embryo for that of a young plant. The embryo of a plant is folded up in the inside of a seed, and is either a short double cone on which two or more cotyledons are fixed, or a simple more or less cylindrical body having no apparent distinction between the cotyledons and the axis. [Embryo.] It has moreover little other than a cellular organization, very often not possessing a trace of the complicated vascular and tubular structure afterwards developed. The act of unfolding, breaking through the integuments of the seed, and acquiring a vascular and tubular as well as cellular organisation, is germination.

Attempts have been made to expedite the process of germination by steeping seeds in a weak solution of chlorine, but no practical advantage has been derived from the experiment. A more effectual plan has been found for hard-shelled seeds, such as those of the Acacia, namely, boiling the seeds for a period between one and five minutes. This has certainly, in some cases, had the effect of causing seeds to grow which under ordinary circumstances would not have grown; a circumstance to be ascribed, we conceive, to the hard integuments of the seed being so much softened as to offer no great resistance to the attempts of the embryo to escape from within them, attempts which required no assistance when the embryo was in full activity and the seed-coat comparatively soft, but indispensable when these conditions are reversed by the loss of vigour in the embryo and the excessive induration of the case containing it.

GERONA. [Cataluña.]

GERS, a department in the south of France, formed out of the territory of Armagnac and a small part of Comminges, is bounded N. by the department of Lot-et-Garonne; N.E. by that of Tarn-et-Garonne; E.S.E. by that of Haute-Garonne; S. by that of Hautes-Pyrénées; W. by Basses-Pyrénées and Landes. It extends from 43° 17′ to 44° 4′ N. lat., and from 1° 11′ E. long. to 0° 16′ W. long. Its greatest length, E. to W., is 73 miles; N. to S., 53 miles. The area is 2418 square miles. The population in 1841 was 311,447, which gives 128.77 to the square mile, being 39.23 below the average per square mile for all France.

The department is hilly; the lower slopes of the Pyrenees, running generally from north to south, cover the greater part of the surface. The most important of these ridges runs N. by W., and separates the basin of the Garonne from that of the Adour. Thirty-eight watercourses mark out as many valleys of great beauty and fertility, opening in width from a few yards, in their southern, to three or four miles in the northern extremities, and separated from each other by the ridges of hills before mentioned. The rivers Save, Gimone, Arratz, Gers (which flows from Haute-Pyrénées and gives name to the department), Baïse, and Losse flow northwards through the department on their way to join the Garonne. The Midou and the Douze flow north-westwards, and unite at Mont-de-Marsan in the department of Landes to form the Midouze, a feeder of the Adour. The Arros joins the Adour in this department a little below Plaisance. The Adour itself crosses the south-western angle of the department, receiving several mountain streams on its left bank. All these rivers are subject to inundations at the time of the melting of the snows on the Pyrenees, and none of them are navigable. The gradual rise of the country from N. to S. is seen by the height of the hills inclosing the valley of the Gers. On the confines of Lot-et-Garonne these hills are 318 feet, at Auch 721 feet, and at Mont-d'Astarac, in the south of the department, 1180 feet, above the sea-level. The department is traversed by 8 royal, 19 departmental, and 46 parish roads.

The climate is very changeable. From October to May rain, snow, and frost alternate, the cold being most intense in January; from May to the end of June the weather is warmer, and thunder and hail storms are frequent; July and August are very hot; September is the most agreeable month, but even then the mornings and evenings are cold. The prevailing winds blow from east and west.

The department contains 1,547,921 acres, distributed among 102,145 proprietors, and into 1,191,277 parcels. Of this surface 824,336 acres are arable; 150,406 are natural pasture; 150,075 are covered with woods and forests; 216,897 are occupied with vineyards; 49,999 are covered with ponds, rivers, and canals of irrigation; 88,347 are heath and moor land. The surface consists

of a stiff clay, resting on thick layers of clay of great depth, separated in some instances by thin layers of sand or tufa. The nucleus of the hills is argillaceous limestone. Breadstuffs are grown in quantity, more than enough for the consumption; wheat, maize, peas and beans, oats and rye are grown; cabbage of various kinds, garlic and onions are cultivated extensively. Horned cattle, sheep of inferior breed, mules for the Spanish market, swine, game, and poultry are abundant. Geese and ducks especially are very numerous, and of large size; their wings and legs are salted for export. Marble, building-stone, plaster-of-Paris, marl, potters' clay, and a fusible spar used in glass and china works are found. Some mineral springs, but no metals, are found in the department.

Of manufacturing industry there is little. Coarse woollens, bricks, glass, pottery, and other articles of common necessity are made for home use. The quantity of leather tanned is in excess of the consumption, and some of it is exported. The other exports are brandy, wine, corn, flour, wool, poultry, and cattle. The number of wind and water mills is 1151: 400 fairs are held in the year.

The quantity of wine produced in this department yearly is 24,816,000 gallons, about one-fourth of which is used for home consumption, and the greater part of the remainder is distilled into brandy, known by the name of Armagnac, from the former name of the district. In quantity of alcohol, the Armagnac brandies bear to the Cognac the ratio of 19.5 to 22. Until lately, all brandies paid in France the same duty, whence came the general preference for Cognac, as it contained a greater quantity of alcohol. But for mildness and delicacy of flavour, and for a peculiarly agreeable aroma, both of which qualities improve with age, the Armagnac is a very superior spirit; and it has this advantage over Cognac, that it comes from the still at a strength ready for consumption, whereas Cognac requires reduction of strength, which process, it need not be said, endangers, and may mar, the peculiar excellencies of that spirit. The best qualities of Armagnac are distilled from two varieties of white grape, called *piquepoul* and *clairet*, in the cantons of Montréal, Eauze, Cazaubon, Manciet, and Nogaro.

The department is divided into 5 arrondissements, which, with their subdivisions and population, are as follows :—

Arrond.	Cantons.	Communes.	Pop. in 1841.
Auch	6	136	60,563
Lectoure . . .	5	93	52,140
Mirande . . .	8	229	84,633
Condom . . .	6	128	72,008
Lombez . . .	4	99	42,103
Total . .	29	685	311,447

In the arrondissement of Auch, the chief towns, besides AUCH, the capital of the department, are—*Gimont*, which stands E. of Auch on the Gimone, has a college, a good trade in agricultural produce, and 2816 inhabitants; the parish church and the market-house, which is built over the main street, are the most remarkable structures. *Jegun* is not far from the right bank of the Baïse, to the north-west of Auch, and has a population of 2076. *Saramon*, a small place on the left bank of the Gimone, has 1276 inhabitants. *Vic-Fezensac*, which stands on the left bank of the Losse, is well built, and has 3365 inhabitants, who carry on a brisk trade in brandy, wine, corn, hoops, &c.

In the arrondissement of Lectoure, the chief town, *Lectoure*, situated on the platform of an isolated rock, not far from the right bank of the Gers, has a tribunal of first instance, a college, and 6262 inhabitants, who manufacture coarse woollens, serge, and leather, and trade in corn, cattle, wine, brandy, hides, &c. It is ugly and ill-built; the principal buildings are—a hospital, which occupies the site of the old castle, a large and handsome Gothic church, built by the English, and the former episcopal palace, which, purchased by Marshal Lannes, a native of the town, and presented to the corporation by his widow, now serves for the residence of the mayor, and for the courts of justice. A statue of the marshal in white marble has been lately erected in front of this building. This town is surrounded by several fine promenades; from that of the Bastion the southward view embraces a magnificent scene, with the main ridge of the Pyrenees in the back-ground. *Fleurance*, a well-built town with 3409 inhabitants, stands 6 miles S. from Lectoure, on the left bank of the Gers. *Mauvesin*, on the Arratz, has a population of 2674, and the remains of an ancient castle, which belonged to the Counts of Fezensac. *St.-Clar-de-Lomagne*, which stands on the Arratz, has tape factories, and 1575 inhabitants; and *Miradou*, with a population of about 1000, give names to the other cantons.

In the arrondissement of Mirande, the chief town *Mirande* stands upon the Baïse, and has a tribunal of first instance, and 2724 inhabitants. It is regularly and well built, and surrounded with walls pierced by 4 gates, from which the principal streets lead to a square in the centre of the town. *Aignan*, N.W. of Mirande, 1630 inhabitants. *Marciac*, W. of Mirande, population 1555. *Masseube*, on the left bank of the Gers, population 1806; *Miélan*, which has large sheep fairs, and 2032 inhabitants; *Montesquiou*, with a population of 2000; *Plaisance*, on the Arros, with 1791 inhabitants; and *Riscle*, near the left bank of the Adour, with a population of 1716, give names to the other cantons.

In the arrondissement of Condom the chief town is CONDOM. *Cazaubon*, in the north-west of the department, has brandy distilleries, and 2655 inhabitants. *Eauze*, the ancient *Elusa*, and the metropolitan see of the Roman division Novempopulana, lies N.W. of Condom, and has 3841 inhabitants. The ancient city was sacked by the Goths in the fifth century, again by the Saracens in 732, and finally in the ninth century by the Northmen, who massacred the population. At this last period the seat of the archbishop was

transferred to Auch. *Montréal*, W. of Condom, has manufactures of woollen yarn, tiles, and brandy, and a population of 2727. *Nogaro*, prettily situated near the Midow, and once the residence of the counts of Armagnac, has 2187 inhabitants. *Valence*, S. of Condom, near the left bank of Baïse, has a population of 1589.

In the arrondissement of Lombez, the chief town, *Lombez*, situated in a plain of great fertility on the left bank of the Save, has a tribunal of first instance, and 1677 inhabitants. It was formerly the capital of Bas-Comminges, and the seat of a bishop. *Isle-en-Jourdain*, a neat well-built town, in a pretty situation on the right bank of the Save, has 4933 inhabitants; it was formerly fortified, but in 1799, in consequence of a royalist insurrection, its castle and ramparts were razed to the ground. The department forms the see of the Archbishop of Auch, is included in the jurisdiction of the Cour Royale of Agen, and of the university academy of Cahors, and it belongs to the 10th military division, which has its head-quarters in Toulouse. Under Louis-Philippe it returned 5 members to the Chamber of Deputies; it now returns 8 representatives to the National Assembly. (*Dictionnaire de la France; Annuaire pour l'an* 1848; *Decree of the Provisional Government of the French Republic.*)

GERSON, JOHN CHARLIER DE, chancellor of the University of Paris, surnamed the Most Christian Doctor, was born in 1363, at the village of Gerson, in the diocese of Reims, from whence he took his name. He studied at Paris, where he rose by degrees to be chancellor of the university and canon of Notre Dame. Gerson having loudly inveighed against the assassination of the Duke of Orleans, in the civil and religious contests of the time, was persecuted by the party of the Duke of Burgundy, his house pillaged, and his life only saved by his concealing himself in the vaults of Notre Dame. He however remained true to his opinions and equally courageous in expressing them. He next distinguished himself at the council of Pisa by his firmness and prudence, when the two contending Popes (Gregorius XII. and Benedict XIII.) were deposed, and Alexander V. elected. He appeared at the council of Constance as the ambassador of Charles IV. of France, and as representative of the French church and of the University of Paris. He there exercised great influence in the deposition of Pope John XXIII., who had succeeded Alexander. He maintained the full right of the church to make reform, even with regard to its chief, and helped to establish the supremacy of the church over the Pope in matters of faith and discipline. He disputed with Huss at the Council of Constance; and, although he did not attempt to prevent the martyrdom of the Bohemian reformers, he was in every respect superior to the superstitions of his time. Thus he was unfavourable to the pretensions of St. Bridget, a Swedish nun, whose revelations made then a great noise, and were sanctioned by high authority. Unable to return to France, on account of the Duke of Burgundy's party, Gerson went from Constance to Bavaria, in the disguise of a pilgrim, where he wrote his work 'De Consolatione Theologiæ,' on the model of the work of Boethius, 'De Consolatione Philosophiæ.' The 'Imitation of Jesus Christ,' generally ascribed to Thomas à Kempis, appeared for the first time appended to a manuscript of Gerson's above-mentioned work, dated 1421, and it is doubtful whether he was not the real author of that celebrated work. Gerson remained several years in Germany, after which he returned to France, and fixed his residence in a convent of the Celestine monks at Lyon, of which his brother was the superior, and where he died, 1429, at the age of sixty-six.

GERVASE OF CANTERBURY, an historian of the thirteenth century, was a monk of Christ Church in that city. His 'Chronicle of the Kings of England,' from 1122 to 1200, and a 'History of the Archbishops of Canterbury,' from St. Augustine to Archbishop Hubert, who died in 1205, are his principal works.

GERVASE OF TILBURY, also an historian of the thirteenth century, received his name from Tilbury in Essex, where he was born. Through the interest of the Emperor Otho IV. he was made marshal of the kingdom of Arles in France. He appears to have written a Commentary upon Geoffrey of Monmouth's History of Britain; a History of the Holy Land; a treatise, entitled 'Origines Burgundionum;' and a History of the Kings of England and France, comprised in a work entitled 'Otia Imperialia,' a fragment of which is printed with his name in Duchesne's 'Historiæ Francorum Scriptores,' tom. iii. p. 363.

GERVILLIA, a genus of Conchifers or Bivalves, hitherto only found in a fossil state. M. Defrance first noticed the genus, which he named after M. de Gerville, who discovered in the Baculite limestone of Normandy the species on which the genus was established. Mr. G. B. Sowerby ('Genera of Recent and Fossil Shells'), who judges the genus to have been marine from its associates, and who states that there is good reason for presuming that it was adherent by a byssus, gives the following generic character:—Shell oblong, nearly equivalve, very inequilateral, and oblique; hinge-line rather long, linear, nearly straight, with many irregular rather transverse little pits, and teeth placed below the dorsal edge. Mr. Sowerby regards it as an intermediate genus between *Avicula* and *Perna*. Cuvier, in his last edition of the 'Règne Animal,' places it under *Les Pernes* (*Perna* of Brugnières), between *Crenatula* and *Inoceramus*. The genus occurs in the Cretaceous Group (Green Sand), and largely in the Oolitic Group. (De la Beche's *Geological Manual;* Dr. Fitton's *Systematic and Stratigraphical List of Fossils*, in his paper *On the Strata below the Chalk.*)

GESENIUS, FRIEDRICH HEINRICH WILHELM, was born at Nordhausen, on the 3rd of February, 1786. He was educated in the gymnasium of his native place, and afterwards in the universities of Helmstedt and Göttingen. In 1809 Gesenius was appointed professor of ancient literature in the gymnasium of Heiligenstadt. In the year following he accepted the appointment of professor extraordinary of theology in the university of Halle, where, in 1811, he was raised to

BRITISH MUSEUM LIBRARY
Accession No. B 102.42 1.6.3
U.D.C No. 4-2-31
Date;

the rank of ordinary professor. During the summer of 1820 he made a journey to Paris and Oxford, where he collected materials for his great lexicographical works on the Semitic languages. He died on the 23rd of October, 1842. Gesenius was the greatest scholar of modern times in his particular department of Oriental literature, and the light he has thrown on the Semitic languages, and especially on the Hebrew, has made a new æra in this branch of philology. As a theologian he belonged at first to the Rationalistic party, but after the appearance of Strauss's 'Life of Christ' he joined the philosophical and critical school, in consequence of which he was often very severely attacked by the orthodox party.

His works on the Hebrew language enjoy a universal reputation, and some of them are translated into most European languages. Among the most useful, or those most used, are his Hebrew and Chaldee Lexicon to the books of the Old Testament, his works on Hebrew Grammar, and his German translation of Isaiah, with a commentary. Gesenius also contributed a great number of articles on Hebrew and other Oriental subjects to Ersch and Gruber's great 'Encyclopædia.' Biblical geography is especially indebted to him for the notes which he added to the German translation of Burckhardt's 'Travels in Syria and Palestine,' Weimar, 1823, 2 vols. 8vo.

(*Neuer Nekrolog der Deutschen* for 1842 ; Gesenius, *Eine Erinnerung für seine Freunde*, Berlin, 1842, 8vo.)

GESNER, CONRAD, an eminent scholar and naturalist, who was a shining example of the truth of the remark, that those who have most to do, and are willing to work, find most time. Beginning his career under all the disadvantages attendant on poverty, sickness, and domestic calamity, and cut off at the early age of 48, Gesner left behind him, notwithstanding the cares of the medical profession, which he actively and successfully exercised, such an amount of literary labour as would have won for him the title of one of the most learned and industrious of men, if his useful life had been occupied solely in its production. He was born at Zürich, March 26, 1516. His father appears to have been a skinner or worker in hides. To his maternal uncle, John Friccius, he seems to have been indebted for kind assistance and tuition; but this relation died; the father was killed at the battle of Zug (1531), when the son was only fifteen, and the poor lad set out for Strasburg to seek his fortune. He was among strangers; but his spirit bore him up, and, in the service of the well-known Lutheran, Wolfgang Fabricius Capito, he resumed the study of the Hebrew language, which he had begun to learn at Zürich. On his return to Switzerland, the academy of Zürich allowed him a pension, which enabled him to travel in France. At Bourges, where he stayed a year, Greek and Latin principally engaged his attention, and to assist in defraying his expenses he taught in school. From Bourges he proceeded to Paris, where he does not appear to have done much; and, after a short stay at Strasburg, whither he was led by the hope of employment, the university of Zürich sent for him, and he became a teacher there. He now married, at the age of 20, not with the approbation of his friends, who thought that his income would not be equal to his wants.

The church was his destination, but the strong impulse of his mind stimulated him to the study of physic, to which he determined to apply himself with a professional view; and, resigning his situation at Zürich, he went to Basel as a medical student, his pension being still continued. Here he seems to have commenced his labours for the public in superintending the edition of the Greek dictionary of Favorinus (Phavorinus). A wish to be intimately acquainted with the works of the Greek physicians led him to the acquisition of that language; and he laboured with such earnest zeal and success that he was offered the Greek professorship in the newly founded university of Lausanne, an appointment which he accepted. He afterwards passed a year at Montpelier, where he formed an intimate acquaintance with Laurent Joubert, the physician, and Rondeletius, the naturalist. His emoluments were now not only adequate to his expenses, but moreover enabled him to prosecute the medical and botanical pursuits so dear to him; and at Basel, in 1541, or, as others say, in 1540, he took his degree of doctor in medicine. Zürich was the field of his practice, which enabled him to cultivate his taste for natural history. He founded and supported a botanic garden, collected a fine library, made numerous drawings, and gave constant employment to a painter and to an engraver in wood. In the midst of his laborious profession, the astonishing industry of the man found time for the principal works on which his fame rests. He lived honoured and respected for his talents and benevolence in his native town, till an attack of the pestilence, to which his professional activity most probably exposed him, carried him off in his 49th year. When the plague-boil appeared in his axilla, accompanied by the worst symptoms, he knew that his death was certain. He desired to be carried to his museum, where, amidst the treasures he had collected, and surrounded by the old familiar objects of his studies, he breathed his last in the arms of his wife, for whose love and piety contagion and death had no terrors, with the calmness of a Christian philosopher. This excellent woman survived him. Gesner died Dec. 13, 1565. He left no children. He was buried in the cloister of the great church at Zürich, and was bewailed in abundance of Latin and in some Greek verses. Theodore Beza was among the most elegant of these tributaries; and his funeral oration was pronounced by Josias Simler, who wrote his life (1566, 4to.), of which Gesner himself had given some details in his 'Bibliotheca.' The most complete biography of him is that of Schmiedel, prefixed to Gesner's botanical works.

The 'Historiæ Animalium' must be considered the great work of Gesner. This compilation, having for its object nothing less than a general history of animated nature, concentrating and critically revising all that had been done before the time of the author, enriched with his own knowledge, and illustrated by many incidental remarks in the departments of botany and medicine, might have been

considered as evidence of most persevering and praiseworthy industry, if it had been the production of a recluse whose long life had been entirely spent in the task; whereas it was only one of many books written by a man who gained his subsistence by perhaps the most time-consuming of all professions. Gesner, in this work, which he carried out to completion as far as the Vertebrata are concerned, followed the method of Aristotle; and, though there is not any establishment of genera, it may be considered as the principal source of more modern zoology, from which succeeding writers drew largely, and of which their publications mainly consisted. Gesner's 'Historiæ' were compressed, and appeared under the titles of 'Icones Animalium,' &c. This book is much more common than the original.

Passing by the various learned treatises that flowed from Gesner's prolific pen, we must notice the complete translation of the works of Ælian (1556). Gesner's notes also appear in the edition of Gronovius (London, 1744), &c.

This extraordinary man is said to have designed and painted more than 1500 plants. A large share of the 1500 figures prepared by Gesner for his 'History of Plants,' and left at his death, passed into the 'Epitome Matthioli,' published by Camerarius in 1586; and in the same year, as also in a second edition in 1590, they were used as illustrations of an abridged translation of Matthiolus, bearing the name of the 'German Herbal.'

Besides the above, Gesner left five volumes, consisting entirely of figures, which, together with his botanical works in manuscript, became at last the property of Trew of Nürnberg, and were published under the care of Dr. Schmiedel, physician to the Margrave of Anspach.

In closing our notice of this amiable, learned, and industrious man, it may not be uninteresting to state that, according to Haller, it is probable that Conrad Gesner was the first short-sighted person who aided the defect of his eye with concave glasses.

GESNER, JOHN MATTHIAS, born near Anspach in 1691, became rector of the school of Weimar, and was afterwards professor of eloquence and poetry at Göttingen. He distinguished himself as a classical scholar. Among his chief works are a good edition of the ancient Roman writers on agriculture, 2 vols. 4to., Leipzig, 1735. He published also editions of Horace, Quintilian, Claudian, and a useful Thesaurus 'Linguæ et Eruditionis Romanæ,' 4 vols. folio, Leipzig, 1749. Gesner died at Göttingen in 1761.

GESNERA'CEÆ, a natural order of monopetalous Exogens, allied to *Scrophulariaceæ*, and with them forming a portion of the dicarpous group. They inhabit the hot and damp parts of South America, and in some cases over-run trees with their rooting stems, in the manner of ivy. The prevailing colour of their flowers is scarlet; some however are purple, as the *Gloxinias*, and others pale green, as *Sinningia* and *Drymonia*. Many beautiful kinds are cultivated in our gardens. They are of no known use.

GESSNER, SOLOMON, born at Zürich in 1730, and a painter by profession, distinguished himself both as a painter and a poet. His first publication consisted of pastoral poems, 'Idyllen,' which, though rather tame, had considerable success at the time. 'The Death of Abel,' written in prose, has insured to its author a more lasting reputation. The genuine pathos of the sentiments and the sketch of the patriarchal manners constitute the great charm of the work. His 'First Navigator' is also a pleasing fiction. Gessner enjoyed much popularity in his lifetime, both among his countrymen and among strangers, and his works were translated into various languages. His habits were simple and domestic. Condorcet has written his biography. Gessner died at Zürich in 1787. His correspondence and miscellaneous poems were published after his death. Gessner engraved several of his own landscapes, which are much esteemed. His countrymen have erected a monument to his memory, with his bust, in one of the public promenades at Zürich.

GETA, ANTONI'NUS, younger son of the Emperor Septimus Severus, born about A.D. 190, was made Cæsar and colleague with his father and brother A.D. 208. Geta was distinguished by his mildness and affability, and he is said to have reproved his brother for his proneness to shed blood, in consequence of which he incurred his mortal hatred. When Severus died at Eboracum (York), A.D. 211, he named both his sons his joint successors in the empire. The soldiers, who were much attached to Geta, withstood all the insinuations of Caracalla, who wished to reign alone, and they swore allegiance to both emperors. After a short and unsuccessful campaign against the Caledonians, the two brothers proceeded to Rome, where they performed the funeral rites of their father. Geta, who was fond of tranquillity, proposed to take Asia and Egypt, and to reside at Antioch or Alexandria; but his mother Julia, with tears, deprecated the partition, saying that she could not part from either of her sons. After repeated attempts of Caracalla to murder Geta, he feigned a wish to be reconciled to his brother, and invited him to a conference in their mother's apartment. Geta went, and was stabbed by some centurions whom Caracalla had concealed for the purpose, A.D. 212. His mother Julia tried to screen him, but they murdered him in her arms, and she was stained by his blood and wounded in one of her hands. [CARACALLA.] (Spartianus, *Historia Augusta;* Herodianus, iv.; Dion, lxxvii.)

GETÆ, the name of a northern tribe mentioned in Roman history, who inhabited the country on both banks of the lower Danube, and along the western shores of the Euxine. Those who lived south of the Danube were brought into a kind of subjection to Rome in the time of Augustus, and their country, called Scythia Parva, and also Pontus, is known under the latter name through the poems which Ovid, in his exile, wrote from Tomi, the place of his captivity. He gives a dismal account of the manners of the Getæ, especially in elegies vii. and x. of the 5th book of his 'Tristia.' The maritime part of the country had been in former times colonised by the Greeks. The Getæ are described by Herodotus (iv. 93) as living in his time south of the Ister (Danube).

GEUM, a genus of rosaceous plants. A very common species is the *Avens*, or *Geum urbanum*, a perennial hedge-plant with small yellow flowers. The root of this plant is aromatic and astringent, and is thought to offer the best indigenous substitute for Jesuits' Bark. It is said to communicate an agreeable clove-like flavour to beer and wine.

GE'VAUDAN, LE, a district which formed a part of the old province of Languedoc, and was divided by the river Lot into Haut-Gévaudan and Bas-Gévaudan. It derived its name from the Gabali, its ancient inhabitants, a tribe of the Visigoths. It was bounded E. by the rivers Allier and Borne and the mountains of Lozère, which separated it from the districts of Vévay, and Vivarais, which, with Gévaudan, form the country of Cévennes; S. by the diocese of Alais; W. by Rouerque; N. by Auvergne. It now forms nearly the whole of the department of Lozère. Mende was the chief town, and is still the capital of the department.

GEYSERS. [ICELAND.]

GEX. [AIN.]

GHAUTS. [HINDUSTAN.]

GHEE, a species of butter used by the natives of India. The milk, when first taken from the animal, is boiled in earthen pots for an hour or two; it is then allowed to cool, and a little curdled milk, called Tyre, is added, to promote its coagulation. By the next morning the whole mass has been converted into tyre, or coagulated acid milk. This milk, well churned and boiled with water, produces the ghee, which is rather distasteful to Europeans.

GHEEL. [ANTWERP.]

GHENT (French, *Gand*), the capital of East Flanders, in Belgium, stands at the intersection of the railroads directly connecting Ostend and Malines, Antwerp, and Lille, from which towns it is distant respectively 38, 33, 32, and 42 miles, and is situated in 51° 3′ N. lat., 3° 43′ E. long. The city is at the confluence of the Schelde and the Lys, and is intersected by a great number of navigable canals which communicate with those rivers, and thus form 26 islands connected with each other by 80 bridges. The Sas-van-Ghent Canal, which runs from Ghent towards the north into Zeeland, where it joins the Neuzen Canal, connects Ghent with the West Schelde, and allows sea-going vessels, drawing eighteen feet water, to enter the city.

The origin of Ghent dates traditionally from the irruption of the Vandals into Belgium, in the fifth century, who built here the town or fort Vanda, afterwards called Ganda, or Gandavum Castrum. This tradition receives confirmation from the existence of the fort still called Wandelaers Kasteel (Vandals' Castle), on the left bank of the Schelde within the city. About the year 629, St. Amand converted the inhabitants from paganism, and he founded two monasteries.

In 868 Baldwin Iron-Arm, the first count of Flanders, built a fortress at Ghent, which was called Count's Castle. In the year 968, Baldwin the Younger, count of Flanders, introduced the art of weaving into Ghent.

About the end of the twelfth century, the city became in a great measure independent of its nobles, who squandered their means on crusading expeditions; it had its own municipal government, elected its sheriffs, adopted a seal, and, having obtained various privileges in favour of its trade and manufactures, joined the association of the Hanse Towns. The charter of the city, granted by Count Baldwin of Hainault, dates from 1180, at which time Ghent became the capital of Flanders. By the prosperity consequent on its manufacturing industry, the city increased so rapidly, that towards the end of the thirteenth century it exceeded Paris in extent and population. In the fourteenth century its importance increased, though the tumultuous proceedings of its inhabitants under the two Van Arteveldts [ARTEVELDT, VAN] must have been a considerable drawback. At the beginning of the fifteenth century, the number of its citizens employed in the manufacture of woollens is said to have amounted to 40,000, who in times of war furnished from their number 18,000 armed men. The Emperor Charles V. was born at Ghent, in February 1500. During his reign the city had a population of 175,000. In 1537 the citizens resisted the payment of an extraordinary subsidy, but were speedily reduced to submission, and the emperor deprived them of most of their privileges. On this occasion a citadel was erected for the purpose of holding the citizens in check.

When the confederation was formed for expelling the Spaniards from the Belgian provinces, a congress was held in Ghent; and 'the pacification of Ghent' was publicly signed by the confederates in the town-hall, 8th November, 1576, and on the 11th the Spanish garrison capitulated to the citizens. This citadel was afterwards destroyed.

The capitulation signed 17th September, 1584, again placed Ghent under the dominion of Spain, and the citadel was rebuilt. In 1598 the Belgian provinces were severed from the crown of Spain in favour of Isabella, daughter of Philip II., who married Albert, son of the Emperor of Germany. Ghent was taken by Louis XIV. in 1678, after a siege of six days. The city was occupied by Marlborough in 1706. In 1745 Louis XV., having entered Flanders with Marshal Saxe at the head of 100,000 men, took Ghent by surprise, but the country soon again came into possession of Austria. In 1792 the Netherlands fell under the power of France, and Ghent was constituted the capital of the department of the Schelde, and so continued till the downfal of Napoleon in 1814, when Flanders became part of the kingdom of the United Netherlands. In 1814 the treaty of peace was signed here between Great Britain and the United States of North America. In 1830, on the separation of Belgium from Holland, it became a part of the former kingdom.

Ghent is a handsome, well built city, with about 97,000 inhabitants. It is surrounded by walls, and has seven gate-entrances; of these the Antwerp Gate is much admired for its architecture. The houses are in general picturesque, from the variety of their gable ends, and from the carving upon them. There are several fine promenades in the city. The finest runs along the

Coupure, a canal cut in 1758 to connect the Lys with the Bruges Canal, and consists of a double avenue of large trees; near it is the penitentiary, which has served as a model for many prisons both in Europe and America. The Boulevards which surround the city are also much used as public walks. The Marché-au-Vendredi (Vrydags Markt, or Friday market) is a large square, with a very old tower, in which meetings of the citizens were formerly held, and where criminals are executed.

The cathedral of St.-Bavon, a fine Gothic edifice, was consecrated in 941. Its rebuilding was undertaken in the thirteenth century, but was not entirely finished until the beginning of the sixteenth century. The tower is remarkable both for its elegance and its height, which is 271 feet. The grand altar and the 24 chapels in this cathedral are ornamented with fine paintings, among which are masterpieces by Verbruggen and Rubens, and the celebrated 'Adoration of the Spotless Lamb,' by the Van Eycks (date 1432). The church of St.-Michael, situated in the centre of the city, on the bank of the Lys, is built in a light and delicate style of architecture. It contains Vandyck's celebrated picture of 'The Crucifixion.' The most ancient church in the city is that of St.-Nicholas, which, like all the others, contains paintings and sculptures of considerable merit. The Hotel de Ville is a striking building with two façades, one built in 1482, in moresco-Gothic; the other, which faces the butter-market, built in the early part of the seventeenth century, is in a mixed style. Near this is the beffroi, or belfry tower, built in 1183, on the top of which is the gilt dragon, the trophy of the victory of the inhabitants of Ghent, under Van Arteveldt, over those of Bruges, in 1382. The university, a handsome modern edifice, was founded in 1816. It has a portico with eight Corinthian columns, copied from those of the Pantheon in Rome. The building is large and commodious, and is well furnished with philosophical apparatus and specimens of natural history. The library contains about 60,000 volumes. There is a botanic garden attached to the university. The number of students ranges between 300 and 400. The Royal College of Ghent occupies the greater part of the ancient abbey of Baudeloo, a vast building, in which several of the students as well as the professors reside. The Royal Academy of drawing, painting, and architecture, occupies the ancient college of the Augustines, and is attended by great numbers of students.

Ghent contains 21 public hospitals, besides several private establishments for benevolent purposes. The hospital of Byloke, established in 1225, has accommodation for 600 patients.

About 19,000 persons are employed in spinning, weaving, bleaching, and printing cotton. Sugar-refining is carried on to a large extent in several establishments. Among the various other manufactures are those of lace, silk-weaving, salt-refining, paper-making, woollen cloths, tanning, bleaching, soap-boiling, and pin-making.

GHIBERTI, LORENZO. This eminent sculptor, whose life makes an epoch in the history of Italian and modern art generally, was born at Florence (it is presumed in 1378), where his step-father Bartoluccio instructed him in drawing and in all kinds of ornamental working in metals. Ghiberti also practised painting in his youth. He had just completed a fresco in the palace of Pandolfo Malatesta at Rimini, in 1401, when a competition was opened at Florence for the design of a second pair of gates to the Baptistery, worthy of those previously executed by Andrea Pisano about 1430. From among the multitudes of artists who competed, seven were chosen to make trial on a given subject, the sacrifice of Isaac, and Ghiberti was one of the seven. Of the designs produced, only those of Ghiberti and Brunelleschi have been preserved; and Brunelleschi was so well pleased with the excellence of the design by his rival, that he solicited that the sculptures for the gates might be left solely to Ghiberti. These doors, which contain twenty compartments, or pannels, filled with as many reliefs, consisting of scriptural subjects, besides a profusion of ornamental work in the intermediate spaces, drew from Michel Angelo the eulogium that they were worthy to be the gates of Paradise. Von Rumohr however considers them inferior to Pisano's. Ghiberti executed for the same building another pair of bronze doors, representing in relief various subjects from the Old Testament. Among his other works may be mentioned the admirable bronze relief in the Duomo at Florence, representing San Zenobi bringing a dead child to life, and the three bronze statues of St. John the Baptist, St. Matthew, and St. Stephen, at the church of Or San Michele in the same city. His death is supposed to have occurred soon after 1455. A very interesting kind of artistical biography of him, including notices of all his most celebrated contemporaries, has been published by August Hagen, under the title of 'Die Chronik seiner Vaterstadt vom Florentiner Lorenz Ghiberti,' 1833.

GHILAN. [PERSIA.]

GHIRLANDAIO. *Domenico Corradi*, called *Del Ghirlandaio* (son of the garland-maker), from the profession of his father, was born at Florence in 1451, and died in 1495. He was fertile in invention, and later artists often made use of his works. He was one of the first who, with some correctness of outline, gave character to the face, and was the first Florentine whose works evince a due knowledge of perspective. His brothers, David and Benedetto, were not equal to him. His son Ridolfo, who died in 1560, aged seventy-five, was a pupil of Fra Bartolomeo and a friend of Raphael, some analogy with whose genius, but with inferior powers, may be traced in his pictures. Domenico has the honour of numbering among his pupils Michel Angelo Buonarroti.

GHISI. [MANTUANO.]

GHIZNI, or GHUZNI. [AFGHANISTAN.]

GIAMBERTI. [SANGALLO.]

GIANNO'NE, PIETRO, born at Ischitella, in the province of Capitanata, in 1676, studied at Naples, and applied himself to the profession of the law. His great work, 'Storia Civile del Regno di Napoli,' appeared in 1724. Unlike most other historians who had preceded him, and whose narratives were merely chronicles of kings, and wars and battles, Giannone laboured particu-

larly to investigate the history of civil institutions, of laws, manners, and government. His book comes down to the year 1700. 'Storia del Reame di Napoli,' 1834, by Colletta, is a continuation of Giannone's work. Giannone took especial pains to define the limits of the spiritual and secular powers, and to show by what means the Romish hierarchy had striven to render the empire subservient to the priesthood. The work was censured by the clergy, and Giannone was obliged to leave Naples for Vienna, where the emperor allowed him a small pension. His book was condemned by the Inquisition, and a monk wrote a refutation of it. When the Austrians lost Naples in 1734, Giannone lost his pension, and went to Venice to seek employment, but was ordered away in 1735. He then returned to Geneva, where he wrote another book, and attacked several dogmas of the Roman Catholic Church. Wishing to take the sacrament at Easter, and there being no Catholic church at Geneva, he went, at the invitation of a pretended friend, to a neighbouring village in Savoy, where he was arrested (in 1736), taken to the castle of Miolans, and ultimately to the citadel of Turin, by order of the King of Sardinia, and there died, March 1748, after twelve years' imprisonment. In prison he abjured the opinions which had been condemned by Rome, and was relieved from the interdict of the Inquisition. Don Carlos, on his accession to the throne of Naples, sent for the surviving son of Giannone, and liberally pensioned him for his father's sake. Giannone's views concerning the emancipation of Naples from the temporal jurisdiction of Rome were then steadily carried out. His 'Opere Postume,' chiefly in his own defence, were published after his death.

GIANT (*γίγας*), a man of great or unnatural stature. It is a common opinion, that in the earlier ages of the world men in general possessed superior physical powers, and were of a greater size than they are at present; and this notion seems to have been even more prevalent in ancient times than it is at present. Pliny observes (vii. 16), that 'the whole race of mankind is daily becoming smaller.' Homer more than once makes a very disparaging comparison between his own degenerate contemporaries and the heroes of the Trojan war. But all the facts and circumstances which can be brought forward on this subject tend to convince us that the human form has not degenerated, and that men of the present age are of the same stature as in the beginning of the world. In the first place, though we read both in sacred and profane history of giants, yet they were at the time when they lived esteemed as wonders, and far above the ordinary stature of mankind. All the remains of the human body (as bones, and particularly the teeth), which have been found unchanged in the most ancient urns and burial places, demonstrate this point clearly. The oldest coffin in the world is that found in the great pyramid of Egypt, and Mr. Greaves observes that this sarcophagus hardly exceeds the size of our ordinary coffins, being scarcely six feet and a half long. From looking also at the height of mummies which have been brought to this country, we must conclude that the people who inhabited Egypt two or three thousand years ago were not superior in size to the present inhabitants of that country. Lastly, all the facts which we can collect from ancient works of art, from armour, as helmets and breast-plates, or from buildings designed for the abode and accommodation of men, concur in strengthening the proofs against any decay in nature. That man has not degenerated in stature in consequence of the effects of civilisation is clear; because the inhabitants of savage countries, as the natives of America, Africa, Australia, or the South-Sea Islands, do not exceed us in size. It has been supposed that before the deluge men might have been of a larger form than they are at present, as they are said to have lived to a much greater age; but this is a mere assumption, unsupported by any evidence whatever.

The notion of the existence of giants in former times has, in many instances, been founded on the discovery of the bones of different large animals belonging to extinct species, which have been ascribed to human subjects of immoderate stature. (See the story in Herodotus, i. 68.)

In modern times, the people who have excited the most curiosity and given rise to the most conflicting statements are the Patagonians. The first navigators by whom they were observed represented them as being of colossal stature, but, though more recent and accurate accounts describe them as being a very tall race of men, yet the tallest do not much exceed seven feet.

There is no fixed law by which the human stature can invariably be determined, though there is an average standard from which the deviations either way are not very considerable. The human race varies mostly in height from four feet and a half to a little more than six feet, though men are occasionally met with of a much greater stature. Taking away the disposition to deal in the marvellous, we may probably assert that no man ever existed of the height of more than eight or nine feet. This may be supposed from what we see at present, and from the deviations which occur in the ordinary course of nature in animals. Several individuals, measuring from 7 feet to 8 feet and upwards, have been exhibited in this country. The most celebrated, whose skeleton is in the museum of the College of Surgeons in London, was Charles Byrne, who went by the name of O'Brien; he died at the age of 22, in 1783, and measured 8 feet 4 inches. The skeleton is 8 feet in height.

We may remark that the ordinary size of man is particularly well adapted to his wants and uses, and we generally observe that those individuals who deviate greatly from the common standard, either one way or the other, are generally neither well proportioned nor healthy. The head in giants is commonly too small for the rest of the body, and in dwarfs too large.

In endeavouring to account for the diversities of stature which occur, we must make an observation which is equally applicable to differences of colour, features, and other particulars, in which individuals and particular races differ from each other, namely, that the law of resemblance between parents and offspring, which preserves species and maintains uniformity in the living part of creation, undergoes

only occasional and rare deviations, and those only to a limited extent.

GIANTS' CAUSEWAY, a remarkable columnar basaltic formation on the northern coast of the county of Antrim, in Ireland, situated about midway between the towns of Ballycastle and Coleraine.

The trap district with which this formation is connected occupies almost the whole of the county of Antrim and a considerable portion of the eastern part of Londonderry, comprehending an area of about 800 square miles on both sides of the valley of the Bann. Throughout this area the basalt is found capping all the eminences, and constituting the general superstratum, in beds of an average thickness of about 500 feet. Beneath the basalt occur a series of secondary formations peculiar to this area, consisting, in descending order, of thick beds of indurated chalk, the white limestone of Antrim, succeeded (unless where the series is broken) by mulatto or green sandstone reposing on blue argillaceous limestone, which again rests on the red sandstone of the coal formation, which appears to underlie the greater part of the basaltic tract.

The mass of basalt is considerably thicker towards the northern extremity of the area, and it is here chiefly that the series of columnar formations occur. There are three distinct beds of such formations, the uppermost of which is distinctly observable at Fair Head, on the north-eastern extremity of the coast, and the same formation appears occasionally to recur along the verge of the precipice which trends westward to Dunseverick, at a short distance from which the two lower beds emerge from the sea, and, rising along the escarpment of the rock, form colonnades of the most striking appearance for a distance of nearly three miles, when the upper one is lost in the surrounding masses of basalt, while the lower stratum sinks again under water, its denuded extremity forming that particular group of columns known as the Giants' Causeway.

It is observable that the dimensions of the columns diminish and the perfection of their structure increases as the strata descend. Thus the most perfect arrangement is found in the lowest stratum, of which arrangement the Giants' Causeway affords the most perfect specimen. The upper part of the stratum, being here denuded for a distance of about 300 yards, exhibits an irregular pavement formed of the tops of polygonal columns, so closely arranged that the blade of a knife can with difficulty be inserted in the interstices. The columns are chiefly hexagonal, but polygons of five, seven, and eight sides are of frequent occurrence. These columns are divided into joints of unequal length; each joint is formed by the adjacent extremities being relatively convex and concave. The stone is the most compact and homogeneous variety of basalt. The entire mass of these columns, of which about thirty feet are exposed above the surrounding shingle at the highest point of their denudation, bears a strong resemblance to an artificial mole projecting from the base of the cliff into the sea.

Along the coast at Ushet-haven, Roanscarave, and Thivigh, are several smaller causeways nearly as perfect as the one described. The columnar strata of the islands of Rathlin and Staffa indicate the extent of the same formation northward and eastward.

The vicinity of the Giants' Causeway affords numerous appearances confirmatory of the opinion that the basalt when superinduced over the secondary strata was in a state of fusion from heat: such are the conversion of old red sandstone into hornstone, the conversion of clay-slate into flinty slate, the conversion of coal into cinders, and in numerous instances the conversion of chalk into granular marble, all arising from the contact of trap dykes with the altered strata.

(*Philosophical Transactions; Transactions of the Geological Society*, vol. iii.; *Guide to the Giants' Causeway*, Dublin, 1834.)

GIARDI'NI, FELICE, was born at Turin, in 1716, and entered as a chorister in the cathedral at Milan. At the age of seventeen he joined the orchestra of the Opera at Naples. For more than sixty years he performed as a violinist in Italy, Germany, England, and Russia, and gained great fame by his skill on that instrument; but he entered into many theatrical speculations which failed. He died at St. Petersburg, in a state of great poverty, in 1796. Giardini possessed much imagination and a fine taste. He composed an Oratorio ('Ruth'), three operas, and many instrumental pieces; but he is better known as having been a performer than as a composer.

GIBBON. [APE.]

GIBBON, EDWARD, was born at Putney, in Surrey, April 27, 1737. He has given us in his 'Autobiography,' which was published after his death by Lord Sheffield, copious particulars concerning his life and writings. Being a delicate child, his education was chiefly conducted at home under his aunt, Mrs. Porten; and, when he went to Westminster School in 1749, his weak health prevented any severe study. After residing a short time with the Rev. Philip Francis, the translator of Horace, he went to Magdalen College, Oxford, as a gentleman commoner, in his fifteenth year, with a stock of erudition (from his own private desultory reading) that might have puzzled a doctor, and a degree of ignorance of which a schoolboy might have been ashamed. At Oxford again he made little orderly progress, and he was compelled to leave it in 1753, through his conversion to the Roman Catholic faith. His father then sent him to M. Pavillard, a Calvinist minister, at Lausanne, where Gibbon returned to the Protestant church, and devoted himself assiduously to regular study. His first work (written in French), 'Essai sur l'Étude de la Littérature,' appeared in 1761. On his return to England, he was appointed captain in the Hampshire militia, and paid much attention to his duties. In 1774 he was returned to parliament for Liskeard through the interest of Lord Eliot, and supported the North ministry, which, in return, conferred on him a commissionership of trade and plantations. In the next parliament he sat for Lymington. On the dissolution of the North ministry, he lost his place. In 1776 appeared the first

volume of his great work, the 'Decline and Fall of the Roman Empire.' The idea of this work had occurred to him during a visit to Rome in 1764, while listening to the bare-footed friars as they sang their vespers in the temple of Jupiter. The success was decisive. The other volumes followed in 1781 and 1788. From 1783 to 1793 Gibbon resided chiefly at Lausanne, with his friend M. Deyverdun. He returned to London in 1793, where he died, Jan. 16, 1794.

The 'Decline and Fall of the Roman Empire' comprises the history of the world for nearly thirteen centuries, from the reign of the Antonines to the taking of Constantinople by the Turks; it includes also the history of the Christian church. For this portion he was attacked, as an assailant of the divine authority of Christianity; but it was not until Mr. Davis attacked, 'not the faith, but the fidelity of the historian,' that Gibbon defended himself in his 'Vindication.' The 'Decline and Fall' has been translated into almost all European languages. Gibbon wrote various other works, and most of which were collected and published, with Gibbon's letters, autobiography, &c., in the 'Miscellaneous Works,' edited by Lord Sheffield, in 5 volumes 8vo., 1815.

GIBBONS, ORLANDO, was born at Cambridge in 1583. At the age of 21 he became organist of the Chapel-Royal, London. In 1625, attending officially the ceremonial of the marriage of Charles I., for which occasion he composed the music, he took the small-pox, and died on the Whit-Sunday following. He left a son, Christopher, who at the restoration was appointed principal organist to the king, and to Westminster Abbey. He was celebrated for his organ-playing, and is said to have instructed Dr. Blow on this instrument. Orlando had also two brothers, Edward, organist of Bristol, and Ellis, organist of Salisbury. The services, anthems, and madrigals of Orlando Gibbons are held in the highest estimation by scientific musicians.

GIBBONS, GRINLING, an artist celebrated for the extraordinary taste and delicacy of execution he displayed in wood-carving, was born in London. Having been recommended by Evelyn to Charles II., the king bestowed upon him a place in the Board of Works, and employed him in the chapel of Windsor, where he executed much of the ornamental carving, consisting of such emblematic objects as doves, pelicans, palm-branches, &c. His other chief works of this kind are in the choir of St. Paul's, at Chatsworth, Southwick in Hants, and in a room at Petworth. All these works are merely ornamental, and analogous to what is termed still-life in painting; yet that Gibbons had talents for those of a higher character is proved by his statue of James II., behind the Banqueting House, Whitehall. He died August 3, 1721.

GIBBOUS, convex on both sides; a term applied to the moon when more than half-grown.

GIBBS, JAMES, an architect of considerable eminence, was born about the year 1674 at Aberdeen, where he took the degree of master of arts at the Marischal College. By the loss of both his parents he was left to his own direction. In his 20th year he visited Holland, where he entered into the employment of an architect, with whom he continued till 1700, when, by the advice and aid of the Earl of Mar, he proceeded to Italy in order to improve himself in his art. After spending ten years in Italy, during several of which he studied at Rome under an architect named Garroli, he returned to England, and found his patron, the Earl of Mar, in the ministry. By that nobleman he was recommended to the commissioners for building the 50 new churches in the metropolis, although his first one, namely St. Martin's-in-the-Fields, was not commenced till 1720-21. In the interim he erected the new building at King's College, Cambridge; a design which, if not much distinguished by originality or any high excellence, exhibits comparatively few of Gibbs's faults. St. Martin's, which was completed in 1726, has been extolled as a first-rate piece of architecture, but chiefly it would seem as an application of a portico upon a satisfactory scale and at a time when such a feature was comparatively uncommon. His other chief works are the church of St. Mary in the Strand, St. Bartholomew's Hospital, and the Radcliffe Library, Oxford, his best production. To this library Gibbs bequeathed a valuable collection of books. He died August 5, 1754, unmarried, and left his property to different individuals and public charities, not forgetting the son of his first patron, the Earl of Mar, to whom he bequeathed a legacy of 1000*l.*, besides an estate worth about 280*l.* a year.

GIBBSITE, a mineral which occurs massive. Its structure is fibrous and radiating. It is whitish and slightly translucent, and consists chiefly of alumina and water.

GIBRALTAR, a town and fortified rock in Andaluçia, the most southern province of Spain. The rock, which is connected with the continent by an isthmus of low sand, and almost wholly surrounded by the waters of the Mediterranean, forms a promontory three miles in length from north to south. The width is irregular, but the entire circumference is about seven miles. Towards the south it terminates in a point called Europa Point, which is in 36° 2′ 30″ N. lat., and 5° 15′ 12″ W. long. This rock, under the name of Calpe, and Mount Abyla (now called *Ceuta*), opposite to it on the African coast, were called by the ancients the Pillars of Hercules, and in very early ages were regarded by the people dwelling to the east of them as the western boundary of the world. (As to Calpe, see Strabo, ed. Casaub., pp. 139, 156, &c.) The Saracens possessed this promontory from the 8th to the 14th centuries, and again for a short time in the 15th. The Spaniards held it from 1462 to 1704, when it was taken by an English and Dutch fleet. The Spaniards made unavailing attempts to regain it in the next few succeeding years, and again in 1727; but the memorable siege lasted from 1779 to 1783, during which General Elliot (afterwards Lord Heathfield), successfully resisted the combined armies and fleets of France and Spain. Gibraltar has never been conquered from the English.

The rock consists principally of a gray compact

marble. It abounds with caves, the most remarkable of which is St. Michael's, on the south-west side. In the perpendicular fissures of the rock bones of various animals, including human bones, have frequently been discovered. The natural productions of Gibraltar are wild rabbits, woodcocks, teal, and partridges; there are also large numbers of monkeys, of a dark fawn colour, and without tails. The climate is temperate during the greater part of the year, and even in the summer months the excessive heat is allayed by a refreshing sea-breeze that sets in during the forenoon and continues till sunset. On whichever side the rock is approached, it has a barren and forbidding appearance. The east and north sides are, from their steepness, wholly inaccessible. Towards the south it is also very precipitous, but on the west side, where the town is built, it gradually declines towards the bay, where the strength of the fortifications is such that the fortress appears to be impregnable. Besides the fortifications there are two excavations, wrought with extreme labour, in the solid rock, called galleries, which extend from two to three miles in length, and are of sufficient width for carriages. Along these galleries, at intervals of every twelve yards, are port-holes bearing upon the neutral ground and bay. The Spanish lines, which extend across the isthmus, are defended by two forts, the principal of which is called St. Philip. The space between these lines and the foot of the rock is called the neutral ground, and it is here that the lazaretto is situated. The town is built on a bed of red sand, near the foot of the north-west side of the hill. It is paved and lighted, and consists chiefly of one street, extending about a mile in length from South-Port to Water-Port. The principal buildings are the governor's and lieutenant-governor's houses, the Admiralty (formerly a monastery of White Friars), the barracks, victualling-office, and store-house, the Spanish church, Jews' synagogue, the south barracks and navy hospitals. The town can neither be called clean nor neat. The houses are built in the English style, but with little regard to their ventilation.

The trade of Gibraltar is not large. The British produce exported thither in 1846 amounted to 605,693*l*. The principal imports thence to Great Britain in the same year consisted of bark for tanning, gum Arabic, raw silk, and brandy. In 1846 there were 1300 children attending public schools. A bishopric of Gibraltar was created in 1842.

GIBRALTAR, THE BAY OF, formed by the headlands of Cabrita Point and Europa Point, is commodious, and secure from all the more dangerous winds. The greatest width is 5 miles; the greatest length is about 8 miles, and the depth in the centre exceeds 100 fathoms. The shipping is protected by two moles, constructed at great expense, and extending into the bay to the respective distances of 700 and 1100 feet.

GIBRALTAR, THE STRAITS OF, anciently called the Straits of Hercules, are about 12 leagues in extent from Cape Spartel to Ceuta Point, on the African coast, and from Cape Trafalgar to Europa Point, on the coast of Spain. Their width at the western extremity is about eight leagues, but at the eastern extremity it does not exceed five. A strong current is constantly running from the Atlantic into the Mediterranean, which renders the passage of sailing-vessels bound to the westward extremely precarious, and only practicable by means of a brisk Levant wind.

GIBSON, RICHARD, a miniature painter and page to Charles I., was born in 1615. He was the pupil of Francis Cleyn, and studied afterwards the works of Sir Peter Lely, whom he imitated; Lely painted his portrait in 1658. Gibson was only 3 feet 10 inches high, and he married, in the presence of Charles and his queen, Anne Shepherd, who was of exactly his own height.

Gibson was patronised also by Philip, earl of Pembroke; and he is said to have painted Cromwell several times. He taught painting to the queens Mary and Anne, daughters of James II. He appears to have been an excellent painter, especially in water-colours.

Gibson and his wife were painted by Vandyck, by Dobson, and by Lely. They had nine children, five of whom lived to maturity, and attained the proper size. Gibson died in 1690, and his wife in 1709, aged 89.

GIBSON, Dr. EDMUND, bishop of London, born 1669, died 1748. Bishop Gibson was the son of Edmund and Jane Gibson, poor persons of the parish of Bampton, in Westmorland. He pursued his studies with great vigour, first in his own county, and then in the university of Oxford, of which perhaps the best proof that could be required is given by his having at the age of twenty-two prepared an edition of the 'Saxon Chronicle', with a translation into Latin, and suitable indexes and other assistances in the use of that valuable historical remain. The work was printed at Oxford in 1692, in a 4to. volume. At that early period of his life he accomplished an enlarged edition of the English translation of Camden's 'Britannia.' This work appeared in 2 vols. fol., in 1695. It appeared again in an enlarged form in 1722, and again in 1772. Richard Gough, an eminent topographical scholar, enlarged it still more, and it appeared in 3 vols. fol., in 1789. It was still further enlarged to 4 vols. fol., in 1806. Another early production of Dr. Gibson was an edition of some historical remains of Sir Henry Spelman, which was published at Oxford in 1698, under the title 'Reliquiæ Spelmanianæ.' In 1693 he produced an edition of 'Quintilian, which is highly esteemed.

Tenison, who in 1694 succeeded Tillotson as archbishop of Canterbury, made Gibson his domestic chaplain, and rector of the parish of Lambeth.

In the reigns of King William and Queen Anne there was a warm controversy concerning the authority of the convocation of the clergy. In this controversy Dr. Gibson took a very active part in defending the power of that assembly. This led to the publication of his great work, the 'Codex Juris Ecclesiastici Anglicani,' 2 vols. fol., 1713, in which he has collected the statutes, constitutions, canons, rubrics, and articles of the Church of England, and digested them methodically under proper heads, with suitable commen-

taries, prefaces, and appendices. It was reprinted at Oxford in 1761. In 1715 he was promoted to the bishopric of Lincoln; and in 1723 translated to London.

Bishop Gibson was ever a strenuous defender of the rights of the church; but he was of what is called the liberal school in respect of doctrines, and he warmly approved of the liberty which the law had granted in his time to persons not conforming to the church to meet together publicly for worship in whatever way they might approve.

In his private relations the bishop was greatly beloved and respected. He closed a life, extended to his eightieth year, almost unequalled for labour in the annals of literary exertion, in 1748, and was buried at Fulham.

GIEN. [Loiret.]

GIESECKITE, a mineral which occurs in hexagonal prisms, granular, of a brownish colour, slightly translucent. It consists chiefly of silica and alumina.

GIESSEN, the chief town of the province of Upper Hesse, in the Grand-Duchy of Hesse Darmstadt, stands on the banks of the Lahn and Wieseck, about 33 miles N. from Frankfurt-am-Main, and has 8000 inhabitants. The town is old and ill-built, except three or four broad streets. The fortifications have been razed, and their site converted into shrubberies and promenades. The university of Giessen was established in the year 1607. The buildings appropriated to its use are handsome, and contain lecture-rooms, a library, clinical establishment, chemical laboratory, museums of natural history and the arts and sciences, &c. The school of chemistry in this university is now universally famous in consequence of the discoveries of Liebig. The town is not a place of much commercial industry, and the manufactures are confined to woollen-yarn-spinning, stocking-knitting, and cotton-weaving, on a small scale.

GIFFORD, WILLIAM, was born at Ashburton, in Devonshire, in April 1757. Though descended from a family once of some name in the county, he was left friendless and penniless at the age of 13, on the death of his parents. His godfather took the remaining effects for debt, clogged with the care of Gifford, whom he put first as cabin-boy on board a little coasting vessel, and then as apprentice to a shoemaker at Ashburton. A strong thirst for knowledge had seized the boy's mind, and his master, finding his services worthless, became harsh, and Gifford sunk into a sort of savage melancholy. From this position he was relieved by a Mr. Cookesley, a surgeon of Ashburton, who conceived a great regard for him, and eventually, by his purse and his influence, caused Gifford to be freed from his indentures, sent to school, and finally, at the age of about 22, to Exeter College, Oxford. Not long after, he sustained a severe affliction in the untimely death of Mr. Cookesley. But Earl Grosvenor, in consequence of the casual perusal of a letter, became interested in Gifford's character and fortunes, gave him a home under his own roof, in or about the year 1782, and in great measure intrusted to him the charge of his son, the late Marquis of Westminster, with whom, though widely differing in politics, Gifford maintained through life an intimate and unvarying friendship. Here ends the romantic part of his history. The rest of his life is simply the chronicle of his works. These comprise (besides occasional poems) the 'Baviad,' a stern and successful satire on the contemptible Della Cruscan style of poetry of the day; the 'Mæviad,' similarly directed against the absurdities of the modern drama; a translation of Juvenal, prefaced by an admirable little autobiography, and editions of Massinger, Ben Jonson, Ford, and Shirley. In 1798, his ability and peculiar political and anti-gallican views, recommended him to be editor of the 'Anti-Jacobin,' and he was afterwards introduced to Pitt, Canning, Lord Liverpool, &c. In 1809 he became the editor of the 'Quarterly Review,' founded in opposition to the 'Edinburgh,' and which became very successful in his hands. His salary, at first 200*l*., was gradually raised to 900*l*. He was appointed by Government paymaster of the Band of Gentlemen Pensioners, and subsequently a commissioner of the lottery. Suffering greatly from asthma in his latter years, he withdrew from society, and in 1824 gave up the editorship of the 'Quarterly Review.' He died December 31, 1826.

GIFT (Law), *donum, donatio*, is the transferring of the property in a thing by one man to another, voluntarily and without any value in return.

The giver is called the donor, and he to whom the thing is given is called the donee. By the common law, real estate might pass as a gift by livery of seisin without deed, but by Stat. 29 Charles II. c. 3, a deed or note in writing is rendered necessary to the transfer of real estate. To complete a gift of goods and chattels delivery is necessary, for until then the transaction is not properly a gift, but a contract, and the English law will not compel a man to perform his contract unless it is founded on what is called a good or valuable consideration.

Gifts are in some cases declared void, as against creditors and purchasers for a valuable consideration. [Bankrupt.]

The subject is most fully elaborated in the Roman Law; and it is treated at great length by Savigny, 'System des Heut. Röm. Rechts,' vol. iv.

As to the law regulating voluntary gifts established by the Code Napoléon, see *Cod. Civ.* b. 3, tit. 2.

GIGGLESWICK. [Yorkshire.]

GIJON. [Asturias.]

GIL VICENTE, surnamed the Plautus of Portugal, was born about 1485, of an old and distinguished family. Having abandoned the study of the law for that of the stage, he wrote pieces which were represented at the courts of King Emanuel (the first of them in 1504), and of King John III., Emanuel's successor. They were very successful. King John often played in them; as did Gil Vicente himself, and his daughter Paula, who was lady of honour to a royal princess, the first dramatic performer of her time, a poetess, and a musician. Lope de Vega and Calderon imitated him, and Erasmus learned Portuguese in order to read his works. These were published by Gil

Vicente's son at Lisbon, in 1562, fol., and comprise autos or religious plays, comedies, tragi-comedies, and farces, of which the last are the best.

GILDAS (surnamed Sapiens, or 'The Wise'), the most ancient British historian now extant, according to Leland, was born in Wales, A.D. 511; but according to other accounts in 493. In the middle of the sixth century he was a monk of Bangor, and a spectator of the miseries and ruin of his countrymen. His epistle, or treatise, 'De Calamitate, Excidio, et Conquestu Britanniæ,' is all that is printed of his writings, and is probably all of his that is extant. The best edition is by Gale, in his 'Rerum Anglicarum Scriptores Veteres,' 3 vols. fol., 1684–7. There is also an English translation, entitled 'A Description of the State of Great Britain, written eleven hundred years since,' 12mo., Lond., 1652. Gildas died, according to Archbishop Usher, in the year 570.

GILDING. In the gilding of articles of metal, pure gold is first combined or amalgamated with quicksilver, by boiling the gold in five or six times its weight of quicksilver. The boiling mixture is poured into cold water, by which it loses a great deal of its fluidity; and it is then squeezed through chamois leather. The amalgam has now the consistence of a stiff clay, has a greasy and gritty feel, and is in the most convenient state for being weighed out into the portions requisite for each respective quantity of work. The main object of bringing the amalgam to this consistence and these proportions is to have it in a form convenient for division and apportionment, as well as for the sake of having a uniform standard by which to ascertain the quantity and value of the gold employed.

On the application, however, of this amalgam to the surfaces of metal, it is found that, as there is no chemical affinity between the substances thus brought into contact, the direct union of them is impossible. Nor can it be effected by allowing them to remain in contact for any length of time. The intervention of a solution of nitrate of mercury is therefore used. This solution is, by the operatives, termed 'quick-water.' When a piece of copper or brass is immersed in or brought in contact with this solution, its surface is immediately converted into an amalgam. To this amalgamated surface mercury and gold amalgam closely adheres, by means of the molecular attraction of the particles of the fluid metals for each other.

The manner in which this agent is applied in practice varies according to the description of articles to be gilt. If they are small, strong, and to be gilt all over, as copper buttons, buckles, and rings, a quantity of them, three or four pounds in weight, is put into a deep glazed earthen pan, or 'jowl;' to these are added about three or four teaspoonfuls of the 'quick-water,' together with the requisite portion of amalgam. The whole is then thoroughly stirred with a brush or stick, till the amalgam entirely covers the surface of every article. When they are completely covered, they are by some gilders rinsed in cold water and dried by shaking in a bag of warm sawdust, while by others this part of the process is postponed to a later period of the operation, and they are put in their wet state, with the generated nitrate of copper still hanging about them, into the cage.

The 'gilding-cage' is made in a cylindrical form, and is generally about 18 inches in length by 9 or 10 in diameter. It is formed of coarse iron-wire gauze, supported by an external framework of iron, and furnished with a solid iron door at one extremity. It is provided with an axle, which extends to a length of about three feet from the end at which the door is placed, and is then terminated by a winch, and to a distance of five or six inches in the opposite direction. The articles under process of gilding are placed in this cage, and the door of it securely fastened; it is then suspended by its axle on two supports in an iron cylinder. The cylinder being previously heated by a coal fire beneath it, to such a degree as to be red-hot over a large proportion of its inferior surface, the cage is introduced, and the doors of the cylinder closed. The heated air contained within the cylinder soon raises the temperature of the substances immersed in it, and, as the cage is kept continually revolving, they have all an equable share of heat, and allow of a nearly equal evaporation of the mercury from all their surfaces. The hinder part of the cylinder is connected with a chamber and flue so constructed as to carry off the deleterious fumes of the mercury.

After the cage, with its contents, has been in the cylinder for a length of time, varying, according to the temperature at which it has been kept, from five minutes to a quarter of an hour, the mercury will be found to have entirely evaporated from the gilt surfaces. Another application of 'quick-water,' and another heating in the cage, are sometimes necessary to bring the surface to a proper state. The gilt articles are then 'heightened,' which is done by continuing to revolve them at the same high temperature within the cylinder, occasionally taking out the cage and shaking them together, that they may all have an equal share of the heat. The end intended to be effected is a partial oxidation of the surface of the gold. This partial oxidation occasions a slight difference of colour, which is perceptible by an experienced eye, and confers on the gold a degree of that orange colour which is so generally admired in golden and gilt articles.

Buttons and articles of a similar description are often gilt only on their tops, or on some other portion of their surfaces, while the remainder is left uncovered with gold, and of the native colour of the metal of which they are manufactured. This is accomplished by brushing them over the part to be gilt with a hard brush wetted with 'quick-water,' or by rubbing it with a piece of chamois leather similarly moistened. They are afterwards briskly rubbed with a dry brush. They are then put into the 'gilding-cap,' which is a white felt hat of a peculiar sort and shape. The amalgam is put into the gilding-cap along with them. The whole is then well shaken together for a few minutes, when the amalgam will be perceived clinging to the amalgamated parts of the goods, but leaving the remainder in their original state. They are then put into the cage, the mercury is evaporated, and they are afterwards heightened in the manner already described.

For larger goods, and where considerable por-

tions of hidden surface are not required to be gilt, there are two modes of preventing the amalgam from adhering to those parts. One is to lacquer those parts, and, after the spirit of wine is thoroughly evaporated, to immerse them in the quick-water, and afterwards apply the amalgam. The other mode of applying the gold is to distribute the quick-water over the parts requiring it by a small brush or camel's hair pencil, and these then have the amalgam applied as before. If, as is sometimes the case, the goods are to be entirely covered, they are immersed at once in the quick-water. If the articles are of a kind which would be injured by revolving in the cage, the heating is effected by other means. Gilt articles are afterwards coloured to a deeper orange tint by the application of several chemical mixtures aided by heat.

It is entirely foreign to the present object to give any remarks on the medical effects of mercury on the human frame. Its consequences, as practically experienced by gilders, consist in soreness of the mouth from salivation, nausea and sickness, an oppressive headache, and, after the lapse of a few years, a paralytic tremor and agitation in all the muscles of the body; nor does any treatment seem to be successful which does not include an entire abstinence from the prosecution of this occupation, and even this is unavailing when 'the shakes' have taken possession of their unhappy victim.

Most gilt articles are burnished by a stone burnisher, formed of a polished piece of black hæmatite. This is fixed into a proper handle. Small articles, as buttons, &c., are placed in a lathe, and the stone applied to them as they revolve; and those that do not admit of this are burnished by hand on a table or bench.

Steel and iron are gilt by being immersed in a mixture of the nitro-muriate of gold with sulphuric ether or alcohol. By combining these liquids together, an alcoholic solution of gold is formed, from which the metal is precipitated by the iron or steel.

Ivory may be gilt by immersing it first in a solution of sulphate of iron, and afterwards in one of nitro-muriate of gold.

The edges of the leaves of books are gilt by applying to them, when squeezed in a press, a composition of four parts Armenian bole and one part sugar-candy, ground together with the white of eggs. Gold leaf is then laid on, and is afterwards burnished by rubbing with a polished piece of agate.

The gilding of porcelain is accomplished by the application of gold-leaf during the process of its manufacture, which is fixed by that intense heat which confers on this substance its enamel or glaze, and is afterwards burnished by a stone as above described.

Carved wood is gilt by laying on a foundation of whiting and size, and a further series of layers of gold-size, to which leaf-gold is made to adhere by wetting the surface underneath it: this is 'burnish-gilding.' In 'oil-gilding,' the gold is made to adhere by using oil-gold-size, instead of burnish-gold-size wetted with water. The former kind of gilding admits of being burnished with a smooth piece of agate, but not the latter.

Glass may be gilt by applying leaf-gold to the glass when wetted with a solution of isinglass.

For the process of Electro-Plating, see ELECTRO-METALLURGY.

GILEAD. [PALESTINE.]

GILL, JOHN, D.D., an eminent dissenting divine of the Baptist persuasion, was born at Kettering, in Northamptonshire, on the 23rd of November (Old Style), 1697. His parents, though in humble life, gave him a superior education in the grammar-school of his native town, until attendance upon episcopal worship was required, when he continued his studies in private, and attained considerable proficiency in the Greek, Latin, and Hebrew languages. About the age of twenty he began to preach at Higham Ferrars among the denomination to which both he and his parents belonged, and in 1719 he removed to London, to take charge of a congregation which then assembled at Horsleydown, Southwark, but removed in 1757 to a new chapel in Carter Lane, near London Bridge, over which he presided until his death, on the 14th of October, 1771. Of his numerous publications, which are said to have been equal to 10,000 folio pages, many were of a controversial character and of temporary interest. That by which he is best known is his 'Exposition of the Bible,' published at various times in distinct portions.

GILLENIA, a genus of plants belonging to the natural order *Rosaceæ*, the sub-order *Spireæ*. There are only two species of this genus. *G. trifoliata* has several stems from the same root, a foot or two in height. It is a native of North America, in shady places, from Florida to Canada. The root is emetic, and possesses properties similar to those of ipecacuanha. *G. stipulacea* grows in humid woods and damp places from Tennessee to Kentucky, in North America. The medicinal properties of this species are the same as those of *G. trifoliata*. The species of Gillenia are elegant and hardy plants, and are therefore worthy of cultivation.

GILLES, ST. [GARD.]

GILLIES, JOHN, LL.D., was born on the 18th of January, 1747, at Brechin, in the county of Forfar, Scotland. Dr. Gillies was educated at the University of Glasgow, where, before he was of age, he taught the classes of the Greek professor, then old and infirm. Soon after this he removed to London with the design of occupying himself in literary labour. But before settling there he paid a visit to the Continent; and on his return he was engaged by the Earl of Hopetoun as travelling tutor to his second son. This young man, while under his care, died at Lyon in 1776; and his tutor's attention to him was rewarded by an annuity for life from his father.

In 1778 Dr. Gillies published his translation of Lysias and Isocrates. He went abroad again with two other sons of the Earl of Hopetoun. Returning to England about 1784, Dr. Gillies published, in 1786, the first part of his 'History of Ancient Greece.' In 1793 he was appointed to succeed Dr. Robertson as Historiographer Royal

for Scotland, a sinecure place with a salary of two hundred pounds a year. In 1794 he married. Enjoying a moderate competency, he prosecuted his studies with leisure; and his subsequent writings appeared at long intervals. In 1830 he settled at Clapham, near London, where he spent the remainder of his quiet old age, and died on the 15th of February, 1836.

Besides his 'History of Greece,' 1786, 2 vols. 4to., and 1820, 4 vols. 8vo., he wrote 'a History of the Ancient World from the Dominion of Alexander to that of Augustus,' 1807–10, 2 vols. 4to., 1820, 4 vols. 8vo. He also translated the Orations of Lysias and Isocrates; Aristotle's Ethic and Politic; and the Rhetoric of Aristotle.

The First Part of the 'History of Greece' appeared in the same year with the first volume of Mitford's work, and, if inferior to it, is yet superior to anything of the sort which our language till then possessed. The plan is well digested; but neither the pompous verbosity of the narrative nor the general dulness of the dissertations is likely to recover for it the popularity which it has lost. The translations of Dr. Gillies do not deserve high praise. They are paraphrastic, and in many places very unfaithful. Those from the orators are the least faulty. But to Aristotle's works his mode of treatment does great injustice. The faults of this translation are exposed, bitterly yet not unjustly, in Thomas Taylor's preface to his version of the Metaphysic of Aristotle. Gillies' version of the Rhetoric is not so bad in the more popular portions; but here also the more abstract portions are very faulty.

GILLIESIA'CEÆ, a very singular natural order of Endogens, with the habit of the Scilleous division of *Liliaceæ*, but with extremely remarkable flowers. They are natives of Chili; one of them, *Gilliesia graminea*, has been figured at folio 992 of the 'Botanical Register,' where a full account of it will be found.

GILLRAY, JAMES, the celebrated caricaturist, was born about the middle of the last century. He was originally a writing engraver, and is said also to have been a strolling player for a short time. He had an acute perception of character, a strong sense of the ludicrous, and at the same time a great ability for drawing, with a practical skill in engraving. His great faculty was the burlesque; his chief subjects, political abuses and the doings of the Tory party. An 'Illustrative Description,' with a complete set of his genuine works in 304 sheets, was published by M'Lean, London, in 1830. Gillray died insane on the 1st of June, 1815.

GILLS. [FISH.]

GILLY. [HAINAULT.]

GILLYFLOWER, the common name of the garden stock, *Mathiola incana*. [MATHIOLA.]

GILLOLO. [MOLUCCAS.]

GILPIN, BERNARD, was born in 1517, in Westmorland. Having resigned a small living in the county of Durham, and exiled himself from England during the early part of the reign of Queen Mary, he ventured to return before her death, and was cordially received by his relative, the estimable Cuthbert Tunstall, Bishop of Durham, who made Gilpin archdeacon of Durham, and rector of Houghton-le-Spring. His bold preaching for ecclesiastical reform led to his citation before Bonner, Bishop of London. 'Give me,' said Gilpin to his house-steward as he set out, 'a long garment, that I may die with decency.' An accident however delayed him on the road; Queen Mary died; the system was changed; and Gilpin returned in joy and peace to Houghton, of which place he continued rector until his death in 1583, although the bishopric of Carlisle was offered to him by Queen Elizabeth. Gilpin was the very exemplar of a true Christian pastor. He went fearlessly forth into the debateable land of the Marches in Northumberland, among the lawless people that occupied it, and did much to change the character of the country. He was called indeed the Northern Apostle. At home he made the wealth of his rectory a blessing to all who were within his influence. All travellers were welcome, and seldom was his hospitality abused. Another of his titles was the Father of the Poor, which explains sufficiently its own origin. We need only add he was a zealous educationist.

GILPIN, WILLIAM (born 1724, died 1804), was of the same family with Bernard Gilpin, being the sixth in descent from William Gilpin, Bernard's elder brother. Dr. Richard Gilpin, who resigned the rectory of Greystock, in Cumberland, on non-compliance with the terms of the Act of Uniformity in 1662, and continued a dissenting minister till his death, in 1699, was the great-grandfather of William Gilpin, whose father, an officer in the army, was superseded as the military governor of Carlisle, just before it was taken by the rebels in 1745.

Mr. Gilpin took orders, obtained a small curacy in the north, married his cousin, and then, to improve his position, took a school at Cheam, in Surrey, which he made very successful. Having thus obtained 10,000*l*., he retired, as he had always said he would, into the country, and was fortunate enough to obtain, at the same time, from his former pupil William Mitford (the historian of Greece) the living of Boldre, on the borders of the New Forest, Hampshire. Here, like his ancestor, he made his vocation a blessing to the place, and died at the age of eighty, on the 5th of April, 1804. As a literary man Gilpin held no mean rank. He wrote a 'Life of Bernard Gilpin,' a 'Life of Latimer,' and Lives of Cranmer, Wicliff, Huss, Jerome of Prague, and Zisca. But he is still better known for his various works on the principles of beauty in landscape, in which, both by the pen and pencil, he exhibited himself as a true artist and a profound lover of Nature. His 'Forest Scenery' may be taken as a good specimen of the series.

GIN. [DISTILLATION; WINE AND SPIRIT TRADE.]

GIN, or GYN, a machine employed instead of a crane, chiefly by artillerymen, for the purpose of raising guns, howitzers, &c. on their carriages. It consists of three round poles, placed up in a pyramidal form, within which a windlass and tackle afford the means of raising weights. It is also the name of the machine for cleansing cotton.

GINGER. [Zingiber.]

GINGUENÉ', PIERRE LOUIS, born at Rennes in Britanny, in 1748, early applied himself to the study of literature and of foreign languages. Having removed to Paris, he made himself known by several works, including a defence of Rousseau. When the Revolution broke out, Ginguené supported it, without advocating its excesses; he wrote in several journals of the time, and edited the 'Décade Philosophique Littéraire et Politique,' from 1794 to 1807. On being made a member of the Institut, he was placed at the head of the department of public instruction. He was sent by the Directory in 1798 as ambassador to the King of Sardinia, but resigned in a few months, probably from the difficulty of reconciling his own honesty with the crooked policy of his masters, who sought for opportunities to dethrone the king. After Bonaparte became first consul in 1799, Ginguené, who had a seat in the legislative body, was chosen member of the tribunate, but owing to his opposition to the encroachments of the executive was ejected in 1802. He then retired into private life, and occupied himself in the composition of his important and valuable work, the 'Histoire Littéraire d'Italie,' 9 vols. 8vo., 1811-19, which he left incomplete at his death in November 1816. Salfi continued the history, and brought it down to the close of the seventeenth century.

GINKELL, GODART DE, first *Earl of Athlone*, was a native of Holland, and the head of a family of great antiquity in that country, where he bore the titles of Baron de Reede, de Ginkell, &c., and was a general of cavalry. He came to England at the time of the Revolution in 1688; and when two Scotch regiments, in March 1689, declared for King James, and marched from Abingdon for Scotland, General Ginkell was sent after them with a body of horse, and soon overtook and reduced them. He commanded a party of Dutch horse at the Battle of the Boyne, July 1, 1690. When King William returned to England, the conduct of the war was left in the hands of Ginkell. The town of Baltimore surrendered to him, June 7, 1691; Athlone was taken by storm July 1; he gained the battle of Aghrim July 12; and put an end to the war by the capture of Limerick Oct. 3. On the 4th of January, 1692, the Commons ordered seven of their members to attend him with the thanks of the House, and on the 20th of February he was made a peer of Ireland, with the titles of Earl of Athlone and Baron of Aghrim. The following year the king made him a grant of the forfeited estates of the Earl of Limerick, amounting to 26,480 acres, which grant appears to have been ultimately revoked by a commission of inquiry. The earl then returned to Holland, but he continued in the service of King William; shared in William's defeat at Lunden, July 29, 1693; commanded the Dutch horse in Flanders in 1695 and 1696, and the Dutch forces generally under Marlborough in the war with France, during the reign of Queen Anne. He died on the 10th of February, 1703. The title became extinct in 1844.

GINSENG, a root found in China, to which extraordinary properties have been ascribed. It is not only considered a universal remedy for all maladies, but is spoken of in the highest terms as a specific in particular circumstances. In spite of all that has been written upon the supposed virtues of this root, botanists believe the Ginseng to be nothing more than a plant called *Panax quinquefolium*, also found in North America, where no such qualities as those spoken of by the Chinese are recognised.

GIOCONDO, FRA GIOVANNI, an Italian architect of Verona (of the fifteenth century), celebrated for his almost universal acquirements, was a great Greek and Latin scholar, a theologian, philosopher, and engineer, and was skilled in perspective and in decoration, especially in inlaid wood-work. He served the Emperor Maximilian in Germany, Louis XII. in France, and Leo X. at Rome: he built the Ponte della Pietra at Verona, the bridge of Nôtre Dame at Paris, and succeeded Bramante as architect of St. Peter's, the foundations of which he much improved. By turning away a great portion of the waters of the Brenta from the Venetian lagoons, the latter were relieved from the vast quantities of mud brought down from the Alps, and a signal benefit was rendered to Venice. Besides other literary services, Giocondo discovered several letters of the younger Pliny, and published an illustrated edition of Vitruvius at Venice in 1511. It appears, from a letter by Raffaelle in 1514, that Giocondo was a friar, and was then above eighty years old. He was still living in 1521. This is all that is known of the dates of his birth and death.

GIOFFRE'DO, MARIO GAETANO, one of the few good architects that Naples has produced, was born in that city, May 14th, 1718, and studied under Martino Buonocore, an architect of considerable reputation, but of little talent. The pupil soon commenced an extensive course of private self-instruction, and also took lessons in design and figure-composition, both from Solimena and from Francesco di Mura, another able artist of that time.

He first became known by his success in a competition for designs for the church of San Giacomo degli Spagnuoli, at Naples, which led to ample employment in that city, and on various public works. In 1768 he published an excellent work on architecture. In 1783 he was rewarded with the post of government architect, but soon afterwards became blind through excessive study, fell into a profound melancholy, and died March 8, 1785.

GIOIA. [Bari, Terra di.]

GIO'JA, MELCHIO'RRE, born at Piacenza in 1767, and studied in the college Alberoni of that town, after which he was ordained priest. He showed at an early age a predilection for the mathematical sciences. When Bonaparte invaded Lombardy in 1796, Gioja went to live at Milan, adopted republican opinions, and became a political writer. The Provisional Government at Milan having offered a prize for the solution of the question, 'Which of the various forms of free government is best suited to Italy?' Gioja ob-

tained the prize. He advocated a constitution on the model of the French one of 1795, with two elective Chambers, an executive Directory, &c., but with some modifications. The result proved unfavourable; the Cisalpine Republic, a mere dependant of France, after changing its constitution two or three times in as many years, fell before the arms of Austria and Russia in 1799. During this turbulent period Gioja wrote several pamphlets, chiefly in reproof of fanatical or dishonest revolutionists, who advised measures of confiscation and proscription against all those whose opinions were different from their own. Gioja, after being imprisoned as a republican in 1799, was liberated in 1800, after the battle of Marengo. He now applied himself chiefly to political economy, and it is upon his works on that science that his reputation is founded. He wrote in favour of a free trade in corn and other provisions. The price of bread continued however to be fixed for years after by the municipal authorities in the towns of Lombardy.

Gioja's reputation rests on his 'Nuovo Prospetto delle Scienze Economiche,' 6 vols. 4to., Milan, 1815–17; a work of considerable research and labour, in which the author has collected and examined the opinions of most economists, Italian and foreign, and tried them by a comparison with the historical facts and institutions of various nations, ancient and modern. At the end of the sixth volume he gives a list of cases in which the interference of the government may be useful to industry, and another of those in which it is mischievous. As a sequel to this work he published a treatise, 'Del Merito e delle Recompense,' 2 vols. 4to., 1818–19, a work full of bold and original ideas, many of which may be highly useful, whilst others appear impracticable in the present state of society.

Gioja's work, 'Dell' Ingiuria e dei Danni e del Soddisfacimento,' 2 vols. 8vo., 1821, is a kind of penal code, the main principle of which is compensation to the injured person. Gioja wrote also a 'Treatise on Ideology,' 'Elements of Philosophy,' 'Il Nuovo Galateo,' or a treatise on good manners, and other works, among which the 'Filosofia della Statistica,' 2 vols. 1826–7, deserves especial mention. Gioja died at Milan, in January 1829. With some eccentricities of temper, he was a most remarkable man for logical perspicuity, vastness of information, and indefatigable labour. He ranks among the very first writers on political economy that Italy has produced.

(Pecchio, *Degli Economisti Italiani*. Romagnoli published a biographical notice of Gioja in the *Biblioteca Italiana*, No. 156.)

GIORDA'NO, LUCA, an eminent painter, called Luca Fa Presto, was born at Naples in 1632, and died there in 1704 or 1705. He studied under Spagnoletto, and afterwards under Pietro da Cortona at Rome. He went to Lombardy to study the works of Correggio, and to Venice to acquire a knowledge of the compositions and colouring of that school. He then returned to Naples. His fine imagination was accompanied by extreme rapidity of execution. The number of his works is very large. His byname, Fa-Presto (Luca, fa presto, Luca, make haste), perpetuates the memory of his father's avarice, who was always urging him on, even at meals, and which became a nickname among Luca's companions. In 1679 he was invited by Charles II. of Spain to adorn the Escurial. He returned to his own country after the monarch's death. His best works are his frescoes, in the Escurial at Madrid, at Florence, and at Rome. Some of his finest pictures are at Dresden. The grand altar-piece in the Church of the Ascension at Naples, representing the Battle of the Angels and the Fall of Lucifer, is by Giordano.

GIORGIO'NE. *Giorgio Barbarelli*, called *Giorgione* ('great George'), one of the most distinguished artists of the Venetian school, was born in 1477 at Castelfranco, in the Trevisano. He received his education at Venice, where he at first devoted himself to music, and became an excellent performer on the lute. He however soon applied to painting, and became the disciple of Giovanni Bellini, but quickly adopted a much freer style. Titian, one of his fellow students, is said to have been so struck at a later period with Giorgione's style and colouring as to have become his pupil; they were intimate at all events, until Giorgione's jealousy was aroused. The greatest works of this artist were in fresco. The 'Finding of Moses,' in the archiepiscopal palace of Milan, and 'Christ bearing the Cross,' at Venice, have been looked upon as his master-pieces. He died at Venice, during the plague, in 1511, at the age of thirty-three years.

GIOTTO (properly *Ambrogiotto Bondone*), born in 1276, at Vespignano, a village not far from Florence, was the son of a peasant. Whilst tending sheep in the fields, he was found by Cimabue drawing a sheep on a piece of slate. The artist was so struck with the performance that he asked Giotto's father to intrust his son to him. He took him to Florence, where he instructed him in painting (in distemper or fresco, oil painting not being then discovered). Giotto soon excelled his master. He first freed art from the dry and hard manner which then prevailed, and gave expression and action, dignity and grace, to his figures. In this last quality he remained unequalled till the appearance of Masaccio. His reputation spread throughout Italy, many cities of which are adorned with his works. He may also be called the restorer of portrait painting, and has, together with the features, given the air and character of Dante, who mentions him in his poems. He was a man of high genius and knowledge, pleasant in conversation, and fond of poetry. He went with Pope Clement V. to France, where he executed many fresco paintings. He died in 1336.

GIOVENAZZO. [Bari, Terra di.]

GIO'VIO (JOVIUS), PAUL, was born in 1483, of a noble family of Como, and studied in the universities of Padua and Pavia. He forsook the medical profession for literature, and going to Rome showed Pope Leo X. some of his compositions, and obtained his favour. He was attached to the suite of Cardinal Giulio de' Medici, afterwards Clement VII., and followed him in various missions. After Clement's accession to the pontifical throne, and the restoration of peace, Clement bestowed on him

the bishopric of Nocera, which Giovio entirely intrusted to a coadjutor. He was present at the famous conference of Bologna between Charles V. and Clement VII. in 1530, and was noticed by the emperor, who gave him an account of his expedition to Tunis, from a history he was writing. On the accession of Paul III., a strict disciplinarian, Giovio met with less favour, and was accused, by satirists and others, of licentiousness and infidelity. Giovio withdrew to his native Como, and built and adorned a delightful residence. He died in December 1552. His chief works are the 'Historiæ sui Temporis,' 2 vols. fol., 1550; 'Illustrium Virorum Vitæ,' fol., 1551. His letters were published after his death.

GIPSIES, a word corrupted from Egyptians, is the name given in England to a wandering race of people who are found scattered over many countries of Europe. Pasquier, in his 'Recherches Historiques,' says that they first appeared at Paris as penitents, or pilgrims, in August 1427, in a troop of more than 100, under some chiefs who styled themselves counts, and that they represented themselves as Christians driven out of Egypt by the Mussulmans. They obtained permission to remain in the kingdom; other troops followed, and they wandered about in all directions, unmolested for many years, committing petty depredations, and their women assuming the calling of fortune-tellers. In 1560 an ordonnance of the states of Orléans enjoined all impostors and vagabonds, styled 'Bohemians' or 'Egyptians,' to quit the kingdom under pain of the galleys. The name of Bohemians, Zigeuner, Gitanos, is given to these people by various nations of Europe. The notion of their being Egyptians is probably derived from the circumstance that many of them came immediately from Egypt into Europe, but their appearance, manners, and language are totally different from those of either the Copts or Fellahs. There are many gipsies now in Egypt, but they are looked upon as strangers, as indeed they are everywhere.

It is now generally believed that the Gipsies migrated originally from India at the time of the great Mohammedan invasion of Timur Beg; that in their own country they belonged to one of the lowest castes, which resemble them in their appearance and habits.

The Gipsies, in their language, call themselves Sind; and their language has been found to resemble some of the dialects of India. ('Bombay Transactions,' 1820.) They have no traditions concerning their origin; no religion of their own, but they adopt the outward forms of the people among whom they live. Everywhere they exhibit the same roving habits, a dislike to a fixed settlement and to husbandry, uncleanness in their food, licentiousness, ignorance and intellectual apathy, a disposition to pilfer, and to impose on the credulity of others. They seldom commit violent robbery or other heinous crimes. In Hungary and Transylvania many of them follow some regular trade and have fixed habitations; they wash gold from the sand of the rivers, and they work iron or copper; some are carpenters and turners, others are horse-dealers, and even keep wine-shops or public-houses. They abound in Wallachia, Moldavia, and Bessarabia, and they are found in Russia as far as Tobolsk. Grollman, in his 'Versuch über die Zigeuner,' Göttingen, 1787, conjectures that there are between 700,000 and 800,000 in Europe, of whom 40,000 are in Spain, chiefly in the southern provinces. In England they have much diminished of late years in consequence of the inclosure of land and the laws against vagrants. J. Hoyland has collected all the information concerning this strange race, in his *Historical Survey of the Customs, Habits, and present State of the Gipsies, &c.*, 8vo., York, 1816.

GIRAFFE, or CAMELOPA'RDALIS (*Giraffa*, Brisson; *Camelopard* of Pennant), a genus of Ruminants, with persistent horns common to both sexes, and constituting the representative of a form intermediate, as Professor Owen's researches demonstrate, between the deer and the antelopes.

The Giraffe, measured from the fore hoofs to the top of the head, stands the tallest of all known quadrupeds. Its skeleton is a very striking object: The small light head lifted on high upon an extremely elongated neck, the high withers, and the slender length of limb, taken together, contrast strangely with the bony fabrics of other quadrupeds; yet this long neck consists only of seven vertebræ, the normal number in mammalia. The horns, if they can be so termed, for they are truly analogous to the peduncles of the horns in the Muntjak deer, being in fact processes of bone covered with skin having a tuft or coronet of black hairs at the top, exist both in the male and female, but are far more developed in the former. But, besides these substitutes for horns, a similar but shorter process projects from the forehead between the eyes, especially in the adult male. According to Rüppell and Cuvier, this protuberance, like the other horns, is articulated by suture to the skull; but Professor Owen has shown that this frontal process is not a true horn articulated by suture, but results from a singular elevation or thickening of the frontal bone. The osseous peduncles, or horns as they are called, continue for a long time united to the skull only by means of suture, and are not fairly anchylosed till an advanced period. This is indeed the case with all the bones of the skull of the giraffe; it would appear indeed that the process of ossification is carried on but slowly in this part of the framework, and, as it respects the horns, that nature, having completed the first stage of her intention —having in fact prepared the peduncles, was arrested in her operations and forbidden to add the antlers.

The dentition is as in the Ruminants generally. In an animal furnished with so long a neck as the Giraffe, a neck moreover peculiarly flexible, a great degree of strength in the *ligamentum nuchæ* might be naturally expected. Accordingly Professor Owen found this ligament immense and consisting of two bilateral moieties: it commences at the sacrum, gains fresh accession from each dorsal vertebra, the spines of which are remarkably elongated for that purpose, is inserted into all the cervical vertebræ with the exception of the atlas,

and attached to the extended surfaces of the occipital region of the skull.

With regard to the stomach and digestive organs, they agree generally with those of the horned ruminant type. There are no water-cells in the rumen, and the cells in the reticulum are very shallow, as in the Reindeer. The gall-bladder is sometimes present, sometimes wanting; in one female dissected by Professor Owen a double gall-bladder was found; but in two males subsequently dissected no trace of this organ could be detected. Professor Owen believes therefore that the absence of a gall-bladder as in the deer (the antelopes have it) is the rule. The kidneys are not lobulated as in the ox, but simple as in the deer and antelopes. The structure of the tongue of the giraffe is very remarkable, it is at once an organ of taste, of touch, and of prehension. It is capable of the most extraordinary elongation, and is flexible to the utmost possible degree. Into the arrangement of the muscles by which this organ is governed, and which are clearly described by Professor Owen (see his edition of Hunter's 'Animal Economy') we cannot here enter; suffice it to say, that the extension and due retraction of the tongue are amply provided for. The tongue is long, slender, and pointed, and is much used in the acquisition of food, as the animal coils it round the twigs and foliage of trees which are drawn by its means between the lips; it is in fact very interesting to see with what address the giraffe uses this instrument, and how dexterously he applies it as a hook or holder; indeed, the power of prehension and the sense of touch are so developed, that the animal can grasp with the extended tongue an ordinary lump of sugar and convey it to the mouth. This organ is very smooth except when the papillæ are raised; it then becomes rougher, and slightly adhesive; it is spotted, but the spots are not raised, there is a black rete mucosum to prevent, as Sir Everard Home thinks, the surface from being blistered by exposure to the sun.

Head of Giraffe, with the tongue elongated.

The lips are muscular, prominent, hair-clad, and extremly flexible; they aid the tongue in its various offices. The ears are large, long, pointed, and moveable, and the sense of hearing is very acute.

Head of Giraffe, showing the frontal protuberance and the mane.

The eyes are full, large, dark, lustrous, and prominent, and the upper eyelid is fringed with long lashes; so prominent indeed are the eyes, that without turning its elevated head the animal can command a survey of the whole horizon, and mark the approach of an enemy from any quarter. Hence the difficulty of stealing upon the giraffe unawares, and the accuracy with which, when run down, it defends itself by a rapid storm of kicks against its aggressor. There are no suborbital sinuses. The nostrils are narrow, and are provided with cutaneous sphincter muscles, for the purpose of closing them at pleasure. Mr. Owen supposes that the object of this mechanism is to keep out the sand when the storms of the desert arise.

The hoofs are simply divided, and the lateral supplemental or rudimentary toes so often occurring in ruminants are wanting.

Along the back of the neck runs a short stiff mane, the tail is moderately long, rather slender, and tufted at the extremity with coarse black hair. The fore-knees are large, and furnished with slight callosities, as is also the chest. The elevation of the withers is remarkable, and from this part to the crupper there is a rapid descent, whence has arisen the idea that the fore-limbs, from the body to the ground, are much longer than the hinder pair; but this is not the case. When about to lie down, the animal first sinks upon the fore-knees, and assumes an attitude apparently very constrained, and certainly not graceful. In walking, the movements of the giraffe are strange and peculiar. It does not then carry its beautiful swan-like neck erect, but obliquely forwards in a line continued from the spine over the withers to the top of the head; while, owing to the shortness of the body and the length of the limbs, the hind hoofs are brought at each step as far forwards as the spot previously occupied by the fore-hoofs, but somewhat to the out-

side, for the hind limbs diverge to a certain degree outwardly from the hock joint. The legs on each side are in action nearly in unison together, those on the right side appearing to alternate with those of the left, and *vice versâ*. The giraffe however is not really awkward, and is very far from being slow: the swiftest coursers of the desert are scarcely equal to the chase, and over rugged and broken ground utterly unable to overtake it.

Giraffe (*Camelopardalis Giraffa*).

Well known as the giraffe is in the present day, from the living specimens which have from time to time been imported into England and France, and from the skeletons and preserved specimens which adorn the large museums of Europe, so little was known respecting it a few centuries ago, that the most incorrect ideas were entertained respecting it. Yet it was known to the ancients, and is by some interpreters regarded as the *Zemer* (usually translated *Chamois*) of Scripture. (Deut., xiv. 5.)

Before proceeding, we may here observe that some naturalists consider that there are two species of Giraffe, one peculiar to Nubia, Abyssinia, and the adjacent districts, the other a native of the wide regions of Southern Africa. The probability is that they are local varieties. Those from South Africa are the largest and the darkest coloured, at least as far as our observation goes. It was with the Nubian variety that the ancients were acquainted. If we are to trust Scheuchzer, Aristotle was unacquainted with this animal, the first of the Greeks who described it being Agatharchides, who lived in the time of the sixth Ptolemæus (Philométor).

However this may be, the ancient Egyptians were well acquainted with the Giraffe. Belzoni noticed it on the wall of the sekos of the Memnonium, and on the back of the temple of Erments. In Gau's 'Nubien' it is represented in relief; and Rosellini, in his great work on Egypt, gives the coloured engraving of a *Pompa*, wherein a Giraffe, with spots very close, is depicted as led by two men, who hold cords tied to the fore-legs; a green monkey, with a red face and long tail, is climbing up the Giraffe's neck. In the *Pompa* of Ptolemæus Philadelphus at Alexandria (Athenæus, lib. v. c. 8, s. 32) one camelopard was exhibited.

The celebrated Prænestine pavement, said to have been made by the direction of Sulla, who held the office of quæstor in Numidia, represents the Giraffe both grazing and browsing; and it seems to be a probable opinion that the artists employed to work in Mosaic, even in Italy and Spain, were Egyptian Greeks. Still the animal does not itself appear to have been seen in Italy before the time of Julius Cæsar, who exhibited it among other animals in the Circensian Games. Varro alludes to a Camelopardalis brought to Rome from Alexandria, and this was probably the individual described by Pliny, viii. 18. In subsequent periods the Giraffe was not unfrequently brought to Rome, and the third Gordian had ten at one time. We trace the animal in the writings of Artemidorus, Strabo, Appian, Heliodorus, and others, till at length we lose it in the darkness of the middle ages. After the revival of letters, the Giraffe again appeared. It is described and figured by Belon. Gillius saw three at Cairo. It was seen by Prosper Alpinus. Gesner describes and figures it, and a strange figure it is. It is also figured by Aldrovandus, Jonston, and others, every representation being more or less erroneous. We may here allude to the 'Historie of Africa,' by Leo Africanus, (Purchas, lib. vi. c. 1. sect. 9.), and to Ludolf's 'Æthiopia,' where the Giraffe, with exaggeration enough, is plainly indicated. Even the figures given by Buffon are more or less erroneous.

After the darkness of the middle ages had passed away, or rather while the dawn was in progress, it would appear that a living Giraffe once more appeared in Europe. This individual was in the possession of Frederick II., king of Germany (crowned 1215), and was sent as a present from the Prince of Damas, now Damascus. It was described by Albertus Magnus under the name of Anabula, with the synonyms, Seraph, Oraflus, and Orasius. Towards the end of the 15th century the soldan of Egypt presented one of these animals to Lorenzo de' Medici, Grand-Duke of Tuscany; it was a great favourite with the inhabitants of Florence, and was accustomed to walk about the streets, stretching its neck to the balconies and windows for fruits and other articles of food. Its picture exists (or did so recently) in the frescoes of the Poggio Acajano, one of the Duke's villas near Florence.

From this time no living Giraffe was seen in Europe for nearly three centuries and a half,

though in that space various descriptions and figures, as we have intimated, were published by writers on natural history, mixed up with abundant errors. From this censure we must except Hasselquist, who describes it from the skin of a specimen apparently immature. ('Voyages and Travels,' 1749–50–51; and also 'Act. Upsal.')

Ray placed the Giraffe in his *Cervinum* genus; and Linnæus assigns it a situation at the head of his genus *Cervus*. ('Syst. Nat.,' 1766.) He gives Ethiopia and Sennaar as its habitat.

About this time however it was ascertained that the Giraffe inhabited South Africa also. In 1764 a rude drawing, with a notice of the Giraffe, observed during a journey of 200 leagues northward of the Cape of Good Hope, made in 1762, was brought before the Académie des Sciences. M. Tulbagh, governor of the Cape of Good Hope, sent the specimen of a South African Giraffe to Leyden, which is well described by M. Allamand in his supplement to Buffon's account.

Sparrman, during his travels in South Africa, from the year 1772 to 1776, became acquainted with the Giraffe, and gives some interesting information respecting it. He notices that, when feeding upon grass, it sometimes bends one of its knees as horses do, and that in plucking leaves from high trees it brings its fore feet about a foot and a half nearer than usual to the hind feet. The Hottentots are fond of the marrow; and of the skin they make vessels, in which they keep water and other liquors. They kill it with poisoned arrows.

Le Vaillant did not meet with the Giraffe till his second journey into the interior of Africa from the Cape, during the years 1783–84–85. His description of the habits of the animal, and his narrative of the incidents of the chase, are interesting and graphic, though perhaps a little overcoloured. From this time we may date our more correct knowledge of this animal, of which several skins found their way, from time to time, into our island. Mr. Paterson, a botanist, sent to the Cape by Lady Strathmore, brought to England the first entire skin of a Giraffe on record. Lady Strathmore gave it to the celebrated John Hunter, in whose museum it was preserved. Afterwards, the trustees of the Royal College of Surgeons transferred the skin to the British Museum: it is in very bad condition, but is preserved as a sort of historical monument. In the same museum are the specimens brought from Cosi Fountain by Mr. Burchell, and one from Central Africa, presented by Colonel Denham; it is a young individual. There are others also of more recent acquisition. The largest male killed by Le Vaillant stood 16 feet 4 inches from the hoofs to the tip of the horns (French measure), and little less could Mr. Paterson's specimen have been. It was in the year 1827 that the first living Giraffe, and moreover from Nubia, was brought to England. The Pacha of Egypt destined four of these animals as presents to some of the European princes: of these one died at Constantinople, one reached Venice, one was sent to Paris, and the fourth, which fell by lot to England, reached its destination in August 1827, but died, worn out by illness, in 1829. Its preserved skin and skeleton were presented by George IV. to the Zoological Society, in the museum of which they are still kept.

In 1836 the arrival at the gardens of the Zoological Society of four living Giraffes, procured in Kordofan by M. Thibaut, created a lively sensation in the scientific world. The following observations by M. Thibaut will be found in the 'Proceeds. Zool. Soc.' of the same year. 'The first run of the Giraffe is exceedingly rapid. The swiftest horse, if unaccustomed to the desert, could not come up with it, unless with extreme difficulty. The Arabs accustom their coursers to hunger and to fatigue. Milk generally serves them for food, and gives them power to continue their exertions during a very long run. If the Giraffe reaches a mountain, it passes the heights with rapidity; its feet, which are like those of a goat (?), endow it with the dexterity of that animal: it bounds over ravines with incredible power; horses cannot, in such situations, compete with it. The Giraffe is fond of a wooded country; the leaves of trees are its principal food; its conformation allows of its reaching their tops. The one of which I have previously spoken as having been killed by the Arabs measured 21 French feet in height from the ears to the hoofs (?). Green herbs are also very agreeable to this animal, but its structure does not admit of its feeding on them in the same manner as our domestic animals, such as the ox and the horse. It is obliged to straddle widely; its two fore feet are gradually stretched apart from each other, and, the neck being then bent into a semicircular form, the animal is thus enabled to collect the grass. But on the instant that any noise interrupts its repast the animal raises itself with rapidity, and has recourse to immediate flight. The Giraffe eats with great delicacy, and takes its food leaf by leaf, collecting them from the trees by means of its long tongue. It rejects the thorns, and in this respect differs from the camel. As the grass on which it is now fed is cut for it, it takes the upper part only, and chews on until it perceives that the stem is too coarse for it. Great care is required for its preservation, and especially great cleanliness. It is extremely fond of society, and I have observed one of them shed tears when it no longer saw its companions or the persons who were in the habit of attending to it.'

The exertions in Nubia of M. Thibaut in behalf of the Zoological Society, crowned as they were with success, encouraged others to make similar attempts. His judicious arrangements had in fact opened the way, and in the course of a few months other living specimens were sent to Malta, and thence transported to England. At one time there were seven Giraffes in London.

The Giraffe, with due care, endures our climate much better than might have been anticipated, and, as we have several proofs, breeds even under some degree of restraint. The period of gestation is about 16 months ('Proceeds. Zool. Soc.,' 1839, p. 108). In confinement the Giraffe eats hay, carrots, and onions, to the latter of which it is very partial. We have never heard these animals

utter any noise or cry, nor do travellers make any mention of their voice.

In its native wilds, the lion (man excepted) is the only foe which the Giraffe has to dread; its mode of defence is by lashing out with its limbs; and Vaillant says, 'I know, beyond a doubt, that by its kicking it often tires out, discourages, and even beats off the lion.' After his dogs had brought an individual to bay, they dared not make an attack, as it defended itself 'with a succession of rapid kicks.'

In natural disposition the Giraffe is timid and gentle, and when domesticated very confiding. It delights in groves of acacia and mimosa trees, to the leaves of which it is extremely partial. Could it be acclimatised, what a noble ornament would the Giraffe be in the parks of England.

For scientific information we refer to Owen's ed. of Hunter's 'Anim. Œcon.,' 'Phil. Trans.' (vol. ii. Abstracts), Ray, Linnæus, Buffon, Cuvier, Hasselquist, &c.; for entertaining details, to Le Vaillant, Sparrman, Burchell, and other travellers. See also 'Proceeds. Zool. Soc.'

GIRALDUS CAMBRENSIS. [BARRI.]

GIRARDON, FRANÇOIS, the son of a bronze-founder, was born at Troyes in 1628. Leaving the law for sculpture, he attracted the notice of the Chancellor Séguier, obtained a travelling pension from Louis XIV., and went to Italy. On his return he was much employed by the king; but, trusting rather to pleasing Le Brun, the favourite court painter, than to the development of his own talents, he obtained office and favour at the expense, in some degree, of his permanent reputation. During the ministry of Louvois, Girardon, with Le Brun, was neglected; but, after the death of the latter, Girardon was appointed curator of the sculpture of the royal palaces. He married Catherine Duchemin, a flower-painter of some reputation. He died September 1, 1715, on the same day as Louis XIV. As an artist, Girardon, with less expression, had more elegance than his rival Puget. His chief works are the Mausoleum of Cardinal Richelieu, the group of the Rape of Proserpine and the four principal figures in the Bath of Apollo, at Versailles, and the bronze equestrian statue of Louis XIV., formerly in the Place Vendôme, Paris.

GIRAUD, COUNT GIOVANNI, one of the best Italian writers of comedy, was born at Rome, Oct. 28, 1776, of a noble and wealthy family of French extraction. Before he was sixteen, he attempted dialogues and scenes in imitation of Goldoni and other dramatists. His first piece 'I Gelosi per Equivoco,' was performed with decided success in 1807. His masterpiece, 'L'Ajo nell' Imbarazzo' ('The Tutor in a Scrape'), followed in the same year. In 1812, and again in 1815, he visited France, and also came over to England for a short time. After the production of various other pieces, he entered into mercantile speculations, failed, and was reduced to comparative poverty. His health became affected; he suffered much from depression, and died in the spring of 1834. Giraud issued separate prefaces to his published pieces, which are interesting and valuable. Some of his works were founded on real circumstances; and the family of the Marchese Albergati, another celebrated dramatist, thought his 'Sospetto Funesto' referred to one of their domestic misfortunes, and obtained the prohibition of the piece.

GIRDLE, a band of leather, or some other substance, to gird up the loins: from the Anglo-Saxon *gyrdel* or *gyrdl*, and that from *gyrdan*, to encircle or bind around.

The term girdle was in former times very frequently used to express the purse, apparently because it was adapted to contain money. The girdle was generally worn in England; and the making of girdles was a trade. Among the ancient companies of London, that of the Girdlers was incorporated as early as August 6, 1448, 27 Henry VI. Their hall, in Basinghall Street, was built in 1681.

GIRGE'NTI, the chief town of a province of Sicily, is built on the slope of a hill about three miles from the coast, and about one mile from the ruins of old Agrigentum. The town is irregularly built; it is a bishop's see, and has about 18,000 inhabitants, who carry on some trade in agricultural produce through the neighbouring harbour, which is frequented only by small vessels. The principal articles of exportation are corn, fruit, and sulphur. The cathedral and the monastery of San Nicolo are the principal buildings. The other towns of the province of Girgenti are—1, Sciacca, a maritime town with 13,000 inhabitants, who are chiefly engaged in the anchovy fishery along the coast. The country around has many plantations of pistachio nuts: 2, Castronovo, inland, on a mountain, with 8000 inhabitants: 3, Bivona, with 6000, and a college. Petroleum is procured in the neighbourhood: 4, Aragona, with an old castle and 6000 inhabitants, is situated in a delightful country interspersed with almond plantations. (Serristori, 'Saggio Statistico.')

GIRODET TRIOSON, ANNE LOUIS, one of the most celebrated of the recent French painters, was born at Montargis on Jan. 5, 1767, and was the favourite pupil of David; he studied also some time in Italy. His name was really Girodet; he adopted that of Trioson in 1812, from his guardian, a physician. His first picture of note was the Dream of Endymion, painted in Rome; and in 1806 he created considerable sensation by his large, extravagant, and unnatural picture of a scene from the Deluge, now in the Louvre with other of his works.

Girodet's chief merits are an elaborate execution and an academical beauty of design; but it is generally a cold, lifeless beauty. One of his best pictures is Pygmalion and his Statue, in the Somariva Collection, which is remarkably chaste and beautiful in composition and execution: it has been engraved by Laugier.

Girodet was a member of the Academy of Painting and of the Institute of France, a knight of the order of St. Michael, and officer of the Legion of Honour. He died December 9, 1824.

A collection of Girodet's literary works, with his life and correspondence, was published in 1829.

GIRONDE, the name given to the æstuary of the Garonne and the Dordogne. [GARONNE.]

GIRONDE, the largest department of France, formed out of the most western part of Guienne, lies between 44° 10′ and 45° 34′ N. lat., 0° 15′ E. and 1° 18′ W. long. It is bounded N. by the department of Charente-Inférieure, E. by that of Dordogne; S.E. by that of Lot-et-Garonne; S. by Landes; and W. by the Bay of Biscay. The form of the department is very irregular, except along the coast, which runs in nearly a direct line N. and S. for 75 miles. The coast is lined with sand-hills, and these are skirted on the land side by the étangs or lakes of Carcans and Canau, and the bay of Arcachon; the lakes communicate with each other and with the bay, which is shallow and studded with islets, and opens into the sea. The greatest length of the department is 106 miles; its greatest breadth 80 miles. The area is 3765 square miles. The population in 1841 was 568,034, which gives 150.87 to the square mile, being 17.13 below the average for all France.

The general character of the surface is level except towards the east, where there are some hills; the country west of the Garonne is a dead flat. The principal rivers are the GARONNE and the DORDOGNE, which unite in this department to form the Gironde; and the north-east is watered by the Isle, an affluent of the Dordogne from the north bank. The feeders of the Garonne which are in the department are, with the exception of the Dropt, all small. In the south of the department, the Leyre flows into the bay of Arcachon. The department is crossed by 7 royal, 19 departmental, and a great number of parish roads. A railroad runs from Bordeaux to La-Teste; and another railroad, which is to join at Orléans the railroad from that city to Paris, is now in course of construction.

The climate is temperate, and, except in the Landes, generally healthy; the sea breezes and the frequent rains temper the heat, which would otherwise be excessive. The Landes, or sandy heaths, of which only a small part has been brought into cultivation, occupy nearly half of the department, extending from the sea to the valley of the Garonne. The sands of the downs along the sea-shore, driven inland by the winds, gradually overspread a considerable tract of country, encroaching yearly from 70 to 80 feet along the whole extent of the coast. The increasing devastation has however been checked by planting broom and other shrubs, by means of which the sand has in most parts become fixed. Between the Garonne and the Dordogne, and in that part of the department which is to the north of the latter river, the soil is chiefly calcareous; it is mingled with considerable districts of sandy and some of gravelly soil, and with rich loamy tracts. The surface of the department measures 2,409,611 acres, distributed among 179,260 proprietors, and subdivided into 1,833,928 parcels. Of this area 564,298 acres are arable; 159,650 are grass land; 343,051 are under vine culture; 806,606 are heath and moorland; 274,030 are covered with woods and forests; 67,841 various cultivation; 45,782 rivers, brooks, and æstuaries. The breadstuffs chiefly cultivated are wheat and rye; a considerable quantity of maize and millet are also grown. The rye and millet are raised in such parts of the Landes as have by dint of manure been brought into cultivation. Excellent fruits and a large quantity of hemp are grown. But the staple produce of the department is wine, of which 44,440,000 gallons are produced annually. The finest clarets are from this part of France, as the growths of Lafitte, Latour, Château-Margaux, (these are in the Médoc district, on the left of the Garonne and Gironde, between Bordeaux and the sea) Haut-Brion, Sauterne, Barsac, and the Vins de Grave. The extensive woods which skirt the sea-coast, or pervade the Landes, consist chiefly of the pine (*Pinus maritima*), from which turpentine, pitch, and charcoal are procured, as well as timber for building and masts for vessels. The cork-tree is abundant.

The Landes are thinly peopled; the inhabitants make charcoal, or tend the numerous flocks, which obtain scanty food amid these sandy wilds. The shepherds, clothed in sheep-skins, traverse the waste on high stilts, balancing and supporting themselves by the aid of a long staff, of the broad head of which they occasionally make a seat, and which they also use to guide their flocks: they employ their leisure in knitting coarse woollen stockings for their own use or for sale. They travel to markets and fairs on these stilts. Among the sheep of the department are many flocks of merinos, and the proprietors are seeking to extend the long-woolled English breeds.

The chief manufactures are calico, muslin, soap, chemical products, pottery, paper, vinegar, brandy, sugar, beer, leather, glass, &c. Ship-building is extensively carried on in Bordeaux. There are several tobacco factories, dyehouses, rope-walks; and a great deal of salt is made along the coast. The department contains 1626 wind-mills and water-mills, 46 iron-foundries, and 347 factories of different kinds. Above 500 fairs are held in the year.

The department is divided into 6 arrondissements, which, with their subdivisions and population, are as follows:—

Arrond.	Cantons.	Communes.	Pop. in 1841.
Bordeaux . .	18	153	258,490
Blaye . . .	4	61	57,187
Lesparre . .	4	30	38,013
Libourne . .	9	132	106,659
Bazas . . .	7	68	54,634
La-Réole . .	6	105	53,051
Total . .	48	549	568,034

In the arrondissement of Bordeaux the chief town is BORDEAUX, which is also the capital of the department. *St.-André-de-Cubsac*, on the road from Paris to Bordeaux, and not far from the Dordogne, has 2010 inhabitants. *Audenge*, near the mouth of the Leyre, on the bay of Arcachon, has a population of 1078, who are chiefly engaged in the manufacture of salt. *Belin*, on the right bank of the Leyre, and in the middle of the Landes, is a small place, with 1546 inhabitants. *Blanquefort*, 6 miles from Bordeaux, has a popu-

lation of 1995. *Cadillac*, in a fertile plain on the right bank of the Garonne, is a pretty town, surrounded by old walls flanked with towers, and has 1967 inhabitants. The fine old castle of the Duke of Epernon, the great ornament of the town, and the finest edifice of the kind in France except the royal palaces, is now used as a penitentiary for women. *Carbon-Blanc*, 6 miles N. from Bordeaux, has copper and lead rolling works, potteries, and 1869 inhabitants. *Castelnau-de-Médoc*, not far from the left shore of the Gironde, stands in a district which produces excellent red wine, and has 1211 inhabitants. *Labrède*, a hamlet of 1329 inhabitants, deserves notice for its château, in which Montesquieu was born, and which was purchased in 1839 by the late Duke of Orléans. *Pessac* and *Podensac* have each about 2000 inhabitants. *La-Teste-de-Buch*, a small seaport on the south shore of the bay of Arcachon, is about 33 miles S.W. from Bordeaux, with which it is connected by railroad. There is a large pine-forest near the town. The inhabitants number 3447, and are chiefly engaged in the coasting trade and in fishing.

In the arrondissement of Blaye the chief town is *Blaye*, which is a seaport and fortress, on the right shore of the Gironde, and has tribunals of first instance and of commerce, and 4174 inhabitants. The town is built at the foot and on the slope of the rocky hill, the summit of which is crowned by a strong citadel. The citadel, with the fortified tower of Paté on an islet in the middle of the æstuary, and the fort of Médoc on its left shore, completely command the passage of the Gironde. Blaye has linen and woollen factories, glass-works, potteries, ship-building-yards, and a considerable commerce in wines, brandies, spirits, oil, soap, fruits, ship-timber, staves, &c. Vessels put into the port of Blaye to complete their cargoes, and to supply themselves with provisions. *Bourg*, advantageously situated for trade on the left bank of the Dordogne, and near its confluence with the Garonne, is a well-built town, with a small harbour for vessels of 300 to 400 tons, and has 2564 inhabitants. *St.-Ciers-la-Lande*, 10 miles N. from Blaye, has a population of 2825. *St.-Savin*, E. of Blaye, has a population of 2000.

In the arrondissement of Lesparre the chief town is *Lesparre*, about 44 miles N.W. from Bordeaux. It has a tribunal of first instance, and contains 1520 inhabitants. The district in which it is situated produces grain, pulse, and wines of excellent quality; the pasturage is also good, and the fruit is abundant. Its commerce consists entirely in the sale of the agricultural produce. *St.-Laurent-de-Médoc*, a town 12 miles S. from Lesparre, with 2692 inhabitants, has a considerable trade in wine, pitch, and tar. *Pauillac*, a maritime town on the Gironde, 26 miles N. from Bordeaux, with a commodious port and a light-house. Vessels drawing too great a depth of water to ascend to Bordeaux unload at Pauillac, and here they take in provisions and water on proceeding to sea. Near Pauillac is the lazaretto of Tremloup. The local trade consists in the exportation of the wines of Château-Lafitte, which is produced in the commune. Population, 3805. *St.-Vivien*, a town with 985 inhabitants, whose trade is chiefly in salt, of which 6,000,000 bushels are annually produced from the neighbouring salt-works.

In the arrondissement of Libourne, the chief town is *Libourne*, a handsome ancient town, situated on the right bank of the Dordogne, at its junction with the Isle, 17 miles E. from Bordeaux. It has a tribunal of the first instance, a chamber of commerce, a hydrographical school of the first class, a communal college, and 9814 inhabitants. It contains also a public library of 3000 volumes, a museum, a botanic garden. A handsome brick bridge of nine arches crosses the Dordogne, and a suspension bridge, of remarkable elegance, crosses the Isle. Its port, where the tide rises from 13 to 16 feet, receives vessels of 300 tons' burden. The manufactures are of cotton-yarn, iron, leather, ropes, and nails; ship-building is also carried on. The trade is in wine and brandy, oak staves, iron, coal, and salt. *Castillon*, on the right bank of the Dordogne, 25 miles E. from Bordeaux, has 3009 inhabitants. There are cotton factories, tan-yards, rope yards, and cooperages, and nails are manufactured to a considerable extent. There is also some trade in wool. Near the town are the remains of an old castle, near which, in 1451, the English were defeated, and Lord Talbot and his son slain. *Coutras*, a town with 3302 inhabitants, 25 miles N.E. from Bordeaux, is built at the confluence of the Dronne and the Isle, which streams are employed for working flour mills, for the supply of Bordeaux. Under its walls Henry IV. gained a victory over the Duc de Joyeuse in 1587. *Sainte-Foy-la-Grande* has 2924 inhabitants, and its trade consists in the making of cotton and woollen caps, linen, and leather. The district around produces an esteemed white wine, brandy, grain of all sorts, and good pasturage for cattle. It is on the left bank of the Dordogne, about 38 miles E. from Bordeaux. *Fronsac*, with 1440 inhabitants, is on the right bank of the Dordogne, not far from Libourne, in a country distinguished for its vine-yards. *Guitres* has 1256 inhabitants, and is on the right bank of the Isle, about 9 miles N.E. from Libourne. *Lussac* and *Pujols* are small towns with respectively 2384 and 775 inhabitants.

The arrondissement of Bazas contains *Bazas*, the capital, an ancient town that dates from the Roman period, and is mentioned by Ptolemæus as an important place under the name of Cossio, the capital of the Vasates. It possesses a tribunal of the first instance, and has 4515 inhabitants. It is picturesquely seated on an eminence, at the foot of which flows the Beuve. It is ill-built on the whole, but has agreeable walks formed upon the walls, the remains of its ancient fortifications. In a handsome square surrounded by an arcade stands the cathedral, a Gothic building of the 13th or 14th century, which, though not large, is well proportioned, and has been classed among the 'historical monuments' of the country. The inhabitants manufacture druggets, make glass bottles, blanch wax, and tan hides. They deal in corn, cattle, wood for fuel, and timber for building. It stands on the high road from Bayonne to Bordeaux, about

33 miles S.S.E. from Bordeaux. *Captieux* has 1431 inhabitants, and is situated in the midst of extensive 'landes.' *Grignols* is about 40 miles S.S.E. from Bordeaux, and has 1735 inhabitants. *Langon* is a handsome little town, on the right bank of the Garonne, and on the road from Bayonne to Bordeaux, has distilleries, tan-yards, and 3986 inhabitants. The town is advantageously situated for commerce, as the tide ascends to its port, whence the excellent wines of the district are shipped. The town is not well built, but the scenery in the vicinity is fine. A suspension bridge over the Garonne unites the town with that of St. Macaire on the opposite bank. *St. Symphorien* (1729 inhabitants), and *Villandrant* (835 inhabitants), are the chief places of their respective cantons; near the latter are some interesting ruins of an ancient castle.

In the arrondissement of La-Réole the chief town *La-Réole*, about 25 miles S.S.E. of Bordeaux, is built on the side of a steep hill, at the foot of which runs the Garonne. It is a place of great antiquity, and there yet remain the ruins of a pagan temple, called the Grande-Ecole, and two towers of a fortress erected by the Visigoths, called the castle of the Four Sisters. The town possesses a tribunal of the first instance, and a communal college. The streets are steep and narrow, the houses ill-built. There are no noticeable public buildings, but the scenery around is pleasant, and from the summits above the town a prospect of great variety is afforded, which includes a large number of villa residences on the banks of the Garonne. The number of inhabitants is 3837, who are employed in manufacturing combs, hats, vinegar, leather, &c.; and they have some trade in corn, wine, brandy, and cattle. All the other chief towns of cantons are small. *St.-Macaire*, opposite Langon, is a small but ancient town with 1513 inhabitants. It is ill-built, and surrounded with old walls, in a state of tolerable preservation. There is a handsome Gothic church, classed among the 'historical monuments,' and it has a small port on the Garonne. *Monsegur*, 35 miles S.E. from Bordeaux, is a small place with 1523 inhabitants; and *Pellegrue*, another, with 1840 inhabitants.

The department forms the see of the archbishop of Bordeaux; it resorts to the Cour Royale and the University Academy of Bordeaux; it is included in the 11th military division, of which the head-quarters are at Bordeaux; and it returned nine members to the late Chamber of Deputies. It now returns fifteen to the National Assembly.

GIRONDI'NS was the name given to a political party which formed a section of the second National Assembly of France, called the 'Legislative,' in contradistinction to the first or 'Constituante,' which framed the constitution of 1791. The members of this party were mostly returned by the departments of the west and south; and as their leaders, Vergniaud, Guadet, Gensonné, &c., represented the department of La Gironde (Bordeaux), the party took the name of Girondins. They showed themselves from the first hostile to the royal power, and they stood opposed to the constitutionalists, who wished to maintain the constitution of 1791. Some of the Girondins were republicans, who had formed notions of liberty on classical models, such as they were then conceived by ardent young men. They had among them some brilliant orators and accomplished individuals; but as a political party they placed themselves in a false position. By their opposition to the constitutionalists they weakened the strength of the middling classes, and left the field open to those who, like Danton and Robespierre, addressed themselves to the turbulent. They had power enough, early in 1792, to induce the king to place among his ministers Roland, Servan, Clavière, and Dumouriez, and they seemed for awhile reconciled to the constitutional monarchy; but a schism broke out among the ministers. Roland, Servan, and Clavière were dismissed, and Dumouriez soon after resigned. Soon after came the scenes of the 20th of June and the 10th of August, 1792, which the Girondins indirectly sanctioned and which destroyed royalty in France. In the convention the Girondins for the most part voted for the death of the king; they tried indeed to obtain a reprieve for him, but in this they failed. They then began to feel their weakness; they struggled for several months against the ascendancy of the Montagne or Terrorist party, which was supported by the mob; the Girondins wished for legal forms, they denounced the popular massacres, but they had no support out of doors to depend upon. At the same time they excited the republican enthusiasm of the French, and it was Brissot, one of their leaders, who proclaimed the principle of democratic proselytism, afterwards sanctioned by the Convention by its decree of the 17th December, 1792, by which 'the people of every country which was entered by the French troops were invited to form themselves into a democracy, under pain of being treated as enemies should they prefer to retain their ancient form of government.' But all this enthusiasm turned to the profit of the Terrorists at home, who were the men of the lower classes, which the Girondins were not. The latter endeavoured to create an opposition in the departments, to counterbalance the influence of the Paris demagogues, but they were denounced as wishing and conspiring to split France into as many republics as there were departments. At last, on the 31st May, 1793, the Convention was assailed by armed multitudes, who demanded the imprisonment of 29 deputies of the Girondin party. The Assembly was obliged to give them up, and on the 31st October following 21 of them were executed, including Vergniaud, Guadet, Gensonné, and Brissot. Others were beheaded afterwards. A few escaped, and reappeared again in the convention after the fall of Robespierre. (Lamartine, *Histoire des Girondins.*)

GIRONS, ST. [ARIE'GE.]

GIRVAN. [AYRSHIRE.]

GISORS. [EURE.]

GIU'LIO ROMA'NO, whose family surname was *Pippi*, was born at Rome in 1492, and became the favourite pupil of Raffaelle at an early age. He assisted the latter in the celebrated 'Battle of Constantine,' and so endeared himself to him that Raffaelle, at his death, made Giulio his chief heir, and directed that his unfinished works should be completed by him. From Raffaelle Giulio imbibed also

his taste for architecture, and when, after Raffaelle's death, Giulio was invited by Frederigo Gonzaga to Mantua, it was as much in the capacities of architect and engineer as of painter that he was called upon to aid that prince in conducting various works for the improvement and decoration of his capital. The greatest was the palace of the Te, which Giulio not only built, but he adorned the interior with a variety and profusion of admirable frescoes and other paintings by himself and his pupils. The defeat of the Titans, in one of the apartments, shows an energy equal to Michel Angelo's; whilst, in another series, the history of Psyche, Giulio has worthily emulated Raffaelle. Reynolds considered Giulio as the greatest of poet-artists. His favourite subjects were mythological, which he often treated with exceptionable voluptuousness. Giulio was about to leave Mantua to succeed Sansovino, as the architect of St. Peter's at Rome, when he died in 1546.

GIVET. [Ardennes.]

GIZZARD, the muscular or pyloric division of the stomach in birds. In these animals the stomach is divided into two parts. The lower œsophagus (the canal which is continued from the crop to the stomach) first dilates into a cavity called the proventriculus, or glandular division of the stomach; this has a very vascular lining membrane, and is furnished with numerous large follicles, or glands, placed between the mucous and muscular coats, which secrete a solvent fluid very similar to the gastric juice in mammalia. This first division of the stomach mostly terminates immediately in the gizzard, which is situated below the liver, on the left side of the abdomen, resting on the intestines. This organ has more or less a lengthened form, and is furnished at its upper part with two openings, the cardiac and pyloric, which are close together; the former communicates with the proventriculus, and the latter with the intestines. Below those openings the gizzard dilates into a pouch, in the middle of the anterior and posterior sides of which is a tendon to which muscular fibres are attached. In birds of prey, whose food is easily digested, the gizzard is a mere membranous cavity; but in graminivorous birds it is furnished with muscles of great power, which are arranged in four masses; the two largest, which are situated anteriorly and posteriorly, are connected with the central tendons, and are called the digastric muscles; between these are two thinner ones.

The lining membrane of the gizzard is very hard and thick, and opposite to the digastric muscles two callous spots are formed by the pressure and friction. The muscles take up so much room in the stomach of graminivorous birds that the crop is a necessary appendage to the gizzard, and transmits the food, little by little, to be digested. The food is triturated in the gizzard by the immediate agency of hard foreign bodies, as sand and gravel, which the birds swallow; these bruise the grains of corn by the action of the muscles, and deprive them of their vitality, when the gastric juice acts upon and dissolves them. The pebbles thus perform the office of teeth.

Hunter inferred that the action of the great digastric muscles of the stomach in birds was rotatory, and says, 'Although the motion of the gizzard is hardly visible, yet we may be made very sensible of its action by putting the ear to the side of a fowl while it is grinding its food, when the stones can be heard moving one upon another.' The pyloric or intestinal orifice of the gizzard is furnished with a valve which is of considerable size in those birds which swallow large stones, as the ostrich; it prevents them from passing into the intestines, and it also keeps the food in the stomach until it has undergone a sufficient degree of trituration or mastication to fit it for nutrition.

GLACIERS are those perpetual masses of ice which are formed and remain in the open air in the valleys and on the slopes of lofty mountains. Those of the Alps are the best known.

The formation of glaciers is due to the great quantity of snow which falls in the cold regions of the mountains, and which the heat of summer can but partially thaw. When the slopes of the lofty peaks are very rapid, the snow slips down into the valleys in the form of avalanches; and, this being added to what falls directly into the valleys, there is accumulated an enormous quantity that becomes compressed by its own weight. Alternate rains and partial meltings convert this snow into a kind of ice, but not so hard, solid, and transparent as common ice: it gradually becomes more icy in texture as it reaches a lower part of the slope. If the ground be tolerably even, the surface of the glacier is also nearly even; but, if the ground be irregular, the beds of ice break into fragments, which get displaced, upheaved, and piled together in every variety of fantastic form, and exhibit immense chasms many feet in breadth, and often more than 100 feet deep. The splitting of the ice on a change of weather, or in consequence of unequal pressure on an uneven bottom, shakes the very hills, and produces a noise which, reverberated from the mountains, sounds like thunder. The breadth and depth of the chasms thus occasioned vary considerably according to circumstances.

Along the anterior edge and lateral margins of some of the larger glaciers there are masses of débris accumulated into the form of long dykes or parapets, which in the Tyrol are known by the name of *trockne muren*, and in Savoy by that of *moraine*, which has more generally prevailed. The formation of the *moraines* is easily conceived. When the rocks bordering the glaciers are themselves bare of snow or ice, they are easily disintegrated by the alternate action of wet and frost, heat and cold; and the fragments thus detached roll down to the lateral edges of the glacier, where the greater part is stopped, while some isolated blocks are urged farther towards the middle. The general inclination of the glacier and its progressive motion downwards also collect a quantity of these débris along the anterior boundary of the ice-field, so that in some cases the whole glacier is entirely surrounded by a moraine. These moraines sometimes attain a height of a hundred feet. In some spots moraines are found where glaciers no longer exist. Besides moraines, there are long and high ridges formed of fragments of rocks, boulders,

sand, and earth, in the middle of the glaciers, and at a considerable distance from the margins. These are considered due to the motion of the glacier, which throws the fragments of the moraines into new positions. There is continually water flowing out from the lower parts of the glaciers. This water proceeds from the thawing of the under surface of the glacier, occasioned by subterraneous heat. In winter and spring it bursts away the ice from before it, and gushes out in plenteous streams from the caverns it has excavated.

Notwithstanding the immense accession of snow and ice which the glaciers receive every winter, and which is much greater than what could possibly be thawed by the mere effect of a short summer in the higher Alpine regions, it is found that they have not sensibly increased. This is attributed to four causes—the evaporation from the surface of ice and snow, which is always going on; the melting action during the summer months; the effect of subterranean heat; and the gradual descent of the glacier to a warmer climate.

With respect to the number and extent of the existing glaciers, it is calculated that there are 400 among the Alps alone; varying from 3 to 15 miles long, from 1 to 2¼ miles wide, and some of them having a thickness of 600 feet. Glaciers also are met with in the Pyrenees, the Sierra Nevada of Spain, Norway, Iceland, Spitzbergen, Greenland, Tierra del Fuego, and the Altai Mountains in Siberia.

All the glaciers are gradually descending in the valleys which they occupy; and the cause of this descent has been a subject of much controversy among naturalists within the last few years. The view presented by Mr. Mallet recognises the descent of the glacier by gravity, but adds the hydrostatic pressure of water below the glacier—upward and forward. Professor J. D. Forbes advances the opinion, that glaciers descend in the valleys in consequence of so much mutual yielding and adjustment (plasticity) of their parts as to entitle them to be regarded as viscous or semifluid masses, flowing slowly under the influence of gravity. Mr. Hopkins maintains the mechanical probability of the glaciers sliding down their containing valleys, as solid bodies, owing to the slope of the ground, the movement being exposed to irregularity arising from the loose nature of the ice. M. Charpentier thought the congelation of water in many fissures of the glacier must necessarily urge portions of it forward in the direction of least resistance. M. Agassiz ascribes their onward movement to congelation of water, not in cavities, but in minute capillary fissures and spaces among the granular constituent masses of the glacier. The theory of Professor Forbes is the one most generally received in this country.

The investigations of Agassiz and others have rendered it very probable that this enormous ice-power has been actively at work in early geological periods in situations where now no fields of ice ever occur.

(Saussure, *Voyages dans les Alpes;* Mallet, in *Trans. of the Dublin Geol. Soc.;* Forbes, in *Jameson's Journal;* and *Tour in the Alps;* Hopkins, in *Cambridge Trans. and Phil. Magazine.*)

GLACIS, an elevation of earth surrounding a fortress on the exterior of the covered-way, to which it serves as a parapet. Its crest is eight feet above the terreplein of the covered-way, and its superior surface, which descends with a gentle slope towards the country, is about 50 yards broad.

GLADIATORS were men who fought with swords, 'gladii,' and other weapons, and wounded and killed one another in the circus, the amphitheatre, and other public places, for the entertainment of the Roman people. They were either slaves, prisoners, or convicts, and as such obliged to fight; or volunteers, who exhibited for money. Gladiators were exhibited at many great festivals, for the amusement of the spectators; and the waste of human life thus wantonly sacrificed was increased to a fearful extent in the later times of the Roman republic and under the empire. The practice was defended even by grave men, as serving to keep up a martial spirit and a contempt of death among the people. Constantine, A.D. 325, prohibited gladiators' fights ('Cod. Just.' 11, tit. 44[43]), but the practice, it is said, was not totally extinct in the west till the time of Theodoric. The Greek republics did not adopt the custom of gladiators' fights. In the year 76 B.C. seventy-four gladiators at Capua rose against their master, overpowered the guards, and fled to the mountains, where they were joined by thousands of runaway slaves and peasants. Being led by a gladiator of the name of Spartacus, a Thracian by birth, and a man of superior abilities, they defeated several Roman armies. They were finally overpowered by the prætor M. Crassus, and Spartacus was killed. (Livy, *Epitome,* 95-97; Plutarch; Crassus; Eutropius, b. vi.) [CRASSUS.]

GLAMORGANSHIRE, a county of South Wales, lying between 51° 23′ and 51° 48′ N. lat., and 3° 3′ and 4° 18′ W. long., is bounded N. by Brecknockshire and Caermarthenshire, E. by Monmouthshire, and S. and W. by the Bristol Channel. The form is irregular; the greatest length is 52 or 53 miles; the greatest breadth 27 miles. The area is 792 square miles. The population in 1841 was 171,188.

Coast-line Islands, &c.—The line of Glamorganshire coast, from the mouth of the Rumney, where it adjoins Monmouthshire, to Pennarth harbour, is marshy. High cliffs bound the coast nearly from Pennarth Point to Sker Point. Between Lavernock and Breaksea Points are Sully Island and Barry Island, both small. Barry Island, the larger of the two, is joined to the mainland by an isthmus, or causeway, dry at low water; it is nearly surrounded by cliffs. From Sker Point to the Mumbles the line of coast forms Swansea Bay. The coast is comparatively low, and skirted by broad sands, dry at low water. At the Mumbles, which are small rocky islets just off shore, the limestone cliffs recommence; and thence to the boundary of Caermarthenshire the coast forms the several bays and headlands of Worms Head, Caswell Bay, Oxwich Bay, Port-y-nan Bay, Pwldye Head, Oxwich

Point, Port-y-nan Point, Rossilly Bay, the peninsula of Gower, and Whitford Point. There are also a few small islets.

Surface; Hydrography. — Glamorganshire is covered with mountains, which branch out in every direction, and the highest of which is Llangeinor, 1859 feet.

The general course of the streams is from north to south. The larger streams have their sources in the high lands of Caermarthenshire and Brecknockshire, all within a distance of less than 30 miles of each other, but they diverge as they flow towards the coast. The smaller streams rise in Glamorganshire itself, and flow either into the larger ones or into the sea. The chief rivers are the Romney (30 miles); the Taafe, Taff, or Tâf (38 miles); the Daw, or Thaw (12 miles); the Ogmore (18 miles); the Avon (15 miles); the Neath (23 miles); the Tawe (26 miles); the Loughor (14 miles); and the Cynon (12 miles).

There are several canals in this country. The Cardiff Canal extends from Merthyr Tydvil to a point a mile and a half below Cardiff; about 25 miles. The Aberdare Canal runs from the Cardiff Canal to near Aberdare; about 6½ miles. The Neath Canal makes a short cut between two points on the Neath River; about 14 miles long. The Swansea Canal extends from Swansea Harbour into Brecknockshire; about 17 miles. The Penclawdd Canal has a short course of 4 miles into the æstuary of the Burro.

There are many railways for conveying minerals, among which are the Duffryn Llynvi, and Porth Cawl; the Bridgend; the Aberdulais; the Oystermouth; and the Aberavon railways. The Tâf Vale Railway is both for passengers and goods; and so is the South Wales Railway, now in course of construction.

Geology.—The uppermost of the formations which are found in this county is the blue lias, which occupies the most southern portion of the county. The cliffs formed by this rock are bold and lofty, and samphire grows more plentifully on them than on any other. In the southern part of the county the new red sandstone, the newer magnesian limestone, and gypsum also occur. The rest of the county is occupied by coal-measures and the associated beds, the mountain limestone, and the old red sandstone. The coal-measures occupy all the northern part of the county. The miner finds coal without any considerable descent; for the whole county is intersected with deep valleys in a north and south direction; and the miner, taking advantage of this, drives levels into the adjacent hills and obtains ironstone and coal. There are however many mines in valleys and low places. Near Merthyr, where the coal-field approaches its northern limit, and at the head of the Neath valley, is found a coarse conglomerate of the millstone grit formation, separating the coal-measures from the subjacent carboniferous limestone, which skirts the coal-field nearly all round. In the peninsula of Gower is a central ridge of old red sandstone, with two parallel limestone belts resting one on each side of the sandstone ridge. The coal which occurs in the county is of very varied quality, and applicable to many different purposes. Ironstone is found in the valley of the Neath, but most abundantly near Aberdare and Merthyr, which last may be considered the capital of the iron district of South Wales. There are some lead mines in the district occupied by the carboniferous limestone, near Cowbridge and Llantrisaint. Limestone is quarried in various places.

Divisions and Towns.—Glamorganshire is divided into 10 hundreds, comprising about 128 parishes, which are in the bishopric of Llandaff, except 26 parishes, which are in the bishopric of St. David's. The county contains only one archdeaconry, that of Llandaff. It is included in the South Wales and Chester Circuits. The Lent assizes are held at Cardiff, the summer assizes at Swansea. Five members are returned to parliament, namely, two for the county, one for the district of Cardiff, one for the district of Merthyr Tydvil, and one for the district of Swansea.

The following are the principal towns, with the population of each in 1841:—

Aberavon, a contributory borough to the Swansea parliamentary district, is about 6 miles S. from Neath, on the south-east bank of the Avon, about two miles from the mouth. It is a small place, but is improving. A new floating-harbour has been constructed, and improvements have been made in the coal, copper, iron, and tin-works, in the neighbourhood. Population of the parish, 1290.

Aberdare, a village contributory to the Merthyr-Tydvil parliamentary district, is on the south-west bank of the Cynon, 3 or 4 miles S.W. from Merthyr-Tydvil. There are coal-mines and large iron-works in the neighbourhood. Population of the village, 1322.

Bridgend is on the river Ogmore, about 7 miles W. by N. from Cowbridge. The place is partly on the east bank and partly on the west bank, and the different parts are called Bridgend, Newcastle, and Oldcastle. Population of the parish of Coyty, in which Bridgend and Oldcastle are situated, 1930; of the parish of Newcastle, 1239.

Caerphilly is about 7 miles N. from Cardiff. There are some fine remains of an ancient castle. Caerphilly is a mere village. Population, 634.

Cardiff, the capital of Glamorganshire, on the east bank of the river Taafe or Tâf, about a mile above the entrance of the river into Pennarth Harbour. It is 166 miles from the General Post-office, London, by Calne, Bristol, and Chepstow. The town consists of the principal street running east and west, a second main street at right angles to this, and several others. The town has nearly tripled in population within the last quarter of a century; the streets are regular, well paved, and lighted with gas; the houses are good, especially in the suburb of Crockerton. The church of St. John is spacious and handsome, in the early English style of architecture, with a lofty square embattled tower in a later and more ornate style. The castle, built in early Norman times, but greatly altered in order to its conversion into a modern mansion, is still an interesting structure.

There is at Cardiff a stone bridge over the Tâf, of three large and two smaller arches. The theatre is a neat building with a Grecian portico. There is a county gaol of modern erection. The guild-hall, a respectable modern building, stands in the midst of one of the principal thoroughfares. The summer assizes are held in it. The population of Cardiff, which at the commencement of the present century was under 2000, amounted in 1841 to 10,077. The only manufacture carried on in the town is of iron, and this but to a small extent. The prosperity of the place depends much upon its trade as the port of Merthyr-Tydvil and the iron district up the valley of the Tâf. The trade of the town has been on the increase for some years past. The port has been much improved of late years, and a ship-canal and railroad have been formed. The number of vessels inwards, in 1847 was 1721 (107,829 tons); outwards, 6,615 (450,053 tons). Cardiff is a municipal borough, divided into 2 wards, and governed by 6 aldermen and 18 councillors. The Cardiff parliamentary district comprises the contributory boroughs of Cardiff, Cowbridge, and Llantrisaint.

Cowbridge, 12 miles W. from Cardiff, is a neat town, consisting mainly of one wide street. It was formerly walled. Cowbridge is contributory to the Cardiff parliamentary district. Population of the borough and parish, 1080.

Kenfig is a straggling village 15 miles S. by W. from Neath. Population of the parish of Lower Kenfig, 297. Kenfig is contributory to the Swansea parliamentary district.

Llandaff (Llan-Tâf, the church of the Tâf), though the seat of a bishop, is only a village, on the west bank of the Tâf, about 2 miles N.W. from Cardiff. Population of the village, 570. The present cathedral, which is used as the parish church, comprehends the choir, transepts, and part of the nave of the old cathedral. The length is 300 feet, and the breadth 80 feet. There is a Lady Chapel at the east end of the choir.

Llantrisaint, contributory to the Cardiff parliamentary district, is situated on the brow of a lofty hill, which overlooks the vale of Glamorgan, the Bristol Channel and the hills of Devonshire. There is a town-hall, a market-house, and some ruins of an ancient castle. Population of the parish, which is extensive, and comprises four villages in addition to Llantrisaint, 3222.

Loughor, at the mouth of the Loughor, 12 miles W.N.W. from Swansea, is contributory to the Swansea parliamentary district. Population of the parish, 854. There are collieries and copper-works in the neighbourhood.

Merthyr-Tydvil, 18 miles N. by W. from Cardiff, is situated in a valley on the east bank of the river Tâf. It is a straggling place, with hardly a regular street in it, and the houses are mostly cottages inhabited by labourers employed in the neighbouring iron-works, to which Merthyr entirely owes its importance. The smelting-furnaces are some of the largest in Great Britain. The entire population of the parish, which, in addition to Merthyr, comprises several hamlets, in 1841 was 34,977, which is 12,984 more than it was in 1831. There is a canal and a railroad to Cardiff. The parliamentary borough includes the contributory borough of Aberdare.

Neath is 8½ miles N.E. by E. from Swansea, on the east bank of the river Neath, 2½ miles from its mouth. The Neath Canal passes between the river and the town. The streets are paved and lighted, and have many good houses. There is a town-hall, with a market-house beneath it. There are remains of an ancient castle, to which the present church is supposed to have formerly belonged. The town has a good trade, and the river is navigable to the town for small vessels, but barges are generally used, and the chief port is Britton Ferry, at the mouth of the river. Neath is a municipal borough, governed by 4 aldermen and 12 councillors. It is also a contributory borough to the Swansea parliamentary district. Population of the municipal borough and parish, 4970.

Swansea. [SWANSEA.]

History, Antiquities, &c.—Glamogranshire was originally included in the territory of the Silures. Under the Roman dominion it was included in Britannia Secunda. Roman roads, camps, and stations have been met with in the county. A native prince gave to the district his own name, Morgan, whence the modern appellation. About the close of the eleventh century the county fell into the hands of the Anglo-Norman barons, for whose warlike activity their sovereigns gladly found exercise by encouraging their efforts for the conquest of Wales. Fitzhamon, afterwards Earl of Gloucester, obtained possession of this part of Wales; and, though subject to many revolts, arising out of the refusal of the Welsh to succumb to feudal customs, his family retained it for many generations.

In the troubled reign of Edward II. considerable lands in Glamorganshire were granted to his favourite the younger Despencer, and the county became the scene of violence and confusion, the barons, confederated against the court, ravaging these lands, and at length driving Despencer into banishment, A.D. 1321. On the return of the Despencers from banishment, the younger not only obtained the restoration of his Glamorganshire estates, but their augmentation by new grants. In the troubled scenes of the next two centuries, the possession of this district passed from hand to hand; but an end was put to this state of things in the time of Henry VIII.: the territory of Glamorgan was formed into a county; and the manors of the former lords of Glamorgan passed into other hands, as well as the subordinate lordships.

Of the middle ages Glamorganshire contains many memorials in its ruined castles and monastic remains. Besides the castles of Cardiff, Caerphilly, Neath, and Swansea, there are several others. Coity Castle is about two miles north-east of Bridgend; the ruins are among the most extensive of any in South Wales, being second only to Caerphilly. Of the castles of Llanblethian and Talavan, near Cowbridge; of Morlais, near Merthyr-Tydvil; of Penarth and Penrice, in the peninsula of Gower, west of Swansea, there are small remains. There are also castles at Ogmore,

Oystermouth, St. Donatt's, Marcross, Oxwich, Bewper, Penmark, and Fonmon.

Of the ecclesiastical remains the most conspicuous is Margam Abbey, between the Ogmore and the Avon, south-east of Neath. Of the chapter-house, a beautiful polygon of about 50 feet diameter, the walls remain. Part of the abbey-church, which is of Norman architecture, with semicircular arches, has been kept in repair, and is used as the parish church. There are also ruins in existence of the nunnery of Eglwys Nynydd, the priory of Ewenny, the college of Lantwit, and the abbey of Neath. In the great civil war between Charles I. and the Parliament a severe battle was fought in this county, in which the royalists under Col. Power were defeated.

GLAND. Under this term are included a considerable number of organs in the animal body, which, resembling each other only in a general roundness of form and a firm fleshy substance, possess the most varied internal structure, and perform very different functions. They may be divided into three classes.

1. *Absorbent Glands.*—These form part of the absorbent system. They are masses of various size, of a roundish form, consisting of a congeries of ramified absorbent vessels, frequently communicating with each other, connected by fine dense cellular tissue in which blood-vessels are freely distributed, and at intervals dilated so as to give an appearance, when divided, as if a collection of small cells had been cut into. Their precise use is unknown.

2. *Secernent Glands.*—These are organs of various forms and sizes, whose office it is to separate the various secretory and excretory fluids from the blood. The simplest form of secernent gland is that called a crypt, consisting merely of a pit or depression in the surface of some secreting membrane, as the mucous lining of the intestines or the skin. When this depression is deeper, and assumes a cylindrical form, it is called a tubule; and when its closed extremity is dilated so as to give it the form of a flask, a follicle. In various forms and sizes these simple structures are found in great numbers in all animals, as in the sebaceous follicles by which the oily matter is secreted to lubricate the skin, in the gastric glands, &c. In larger size they occur around the pylorus of many fish, forming worm-shaped appendages, and in different parts of the intestines of insects. Sometimes a number of little follicles are congregated together into one mass, opening on the surface, each by a separate orifice, or by one common duct, around which they are arranged: the former structure is found in the tonsils, &c.; the latter in the Meibomian glands in the eye-lids.

Far more complicated forms are produced when each duct divides into numerous ramifications, each of which terminates in a cul-de-sac, or bears little follicles at its extremity and along its branches. They all consist of simple or ramified ducts, communicating at one extremity by open orifices with the external air, directly on the surface of the skin, or indirectly on the surface of one of the open cavities of the body, as the lungs, intestines, &c., and terminated at the other by a cul-de-sac.

3. *Vascular Glands.*—These are masses consisting of a congeries of arteries and veins, but without any duct opening externally. Their office is quite unknown, and their minute structure uncertain. They include the placenta, renal capsules, spleen, and the thymus and thyroid glands.

GLAND, in Botany, is any superficial callosity, whether of a secreting nature or not. Glands are in all cases formed of cellular tissue, and are very analogous to hairs, from which they differ principally in their more compound structure, and in having their tissue always filled with secretion of some kind.

GLANVILE, a name by which one of the most ancient treatises on the laws and customs of the realm of England is known. It is generally supposed to be the work of Ranulf de Glanvile, who was the chief justiciary in the reign of King Henry II.; but the titles to some of the best manuscripts only set forth that it was written in his time. Earlier than his time it cannot be, for among the exemplifications of law-processes are some which took place in court before this Ranulf. There is a translation of Glanvile by J. Beames, Esq., 1812. There is room for an edition of the original, improved by the collation of the best manuscripts which exist of it, one of which is in the library of Lincoln's Inn.

GLARUS, a canton of the Swiss confederation, is bounded N. by St. Gall, E. and S. by the Grisons, and W. by Schwyz and Uri. The greatest length is about 32 miles, the greatest breadth about 16. The area is about 469 square miles, of which only one-fifth is arable land. It consists mainly of the great valley of the Linth, which river crosses it from south to north, and of the Sernft Thal, or valley of the Sernft, which is an affluent of the Linth. There are also small valleys which open into the two principal ones. It is divided on the south from the valley of the Upper Rhine in the Grisons by a chain of lofty Alps, an offset of which running northwards divides the waters of the Linth from those which flow into the Reuss through the valleys of Uri and Schwyz. To this offset belongs the high and extensive group called Glärnisch, 9000 feet above the sea, and covered with perpetual snow, which extends into the canton of Glarus, and rears its head above the town of that name. Glarus is chiefly a pastoral country. There are about 8000 cows and 5000 sheep, and a vast number of goats. Glarus has also manufactories of printed cottons, muslins, silks, and paper. It imports corn, wine, salt, and colonial produce.

The population of Glarus is about 30,000, of whom between 3000 and 4000 are Roman Catholics. The government is a pure democracy: the Landsgemeinde, or general assembly of all males above the age of sixteen, is the sovereign power. It assembles every year, appoints its magistrates, and decides by show of hands upon the projects of law laid before it by the Landrath, or Executive.

GLARUS, the capital of the canton, is a bustling and cheerful town, in a narrow part of the valley, on the left bank of the Linth. It contains about 4000 inhabitants, and has manufactories of

printed cottons, woollen cloth, some iron-works, and a number of mills. The parish church, an old Gothic building, is used for the service of both Roman Catholics and Protestants. Zwingli was for ten years pastor of Glarus. The other remarkable buildings are the town-house, the hospital, and the new school.

GLASGOW is in the nether ward of Lanarkshire, on the north bank of the river Clyde, in 55° 51′ N. lat., and 4° 18′ W. long. The greatest length of the city, from east to west, is four miles and a half; its average width, from north to south, about two miles, comprising the whole of the ancient royalty, the burghs of barony of Gorbals, Calton, and Anderston, together with parts of the two suburban parishes of Barony and Gorbals, which latter are situated on the opposite bank of the Clyde. It is said that the Romans had a station on the site now occupied by the city; but its origin is generally attributed to St. Kentigern, or St. Mungo, who established a bishopric here in A.D. 560. The place continued to be little else than a religious establishment until 1174–1180, when, by virtue of the charters of William, surnamed the Lion, it became a free burgh of barony. In 1190 the town obtained a royal charter for holding an annual fair; and in the early part of the thirteenth century it appears to have been governed by a provost, wardens, and baillies. In 1450 William Turnbull, the then bishop of Glasgow, obtained from James II. a charter in favour of himself and successors, erecting the burgh and barony of Glasgow into a regality. This charter invested the bishops with very extensive power, and deprived the citizens of a privilege they previously possessed of electing their own magistrates. Towards the end of the fifteenth century Glasgow was changed from a bishopric to an archbishopric, the jurisdiction of which extended over the shires of Dumbarton, Ayr, Renfrew, and Lanark. In 1611 a charter was granted by James VI.; and in 1636 Charles I., by royal grant, incorporated them into one free burgh of regality. These charters relate to what is now called the ancient royalty. The last charter granted to the city is that of William and Mary, which has continued to the present day, and by which the citizens are empowered to elect their own magistrates, provost, baillies, and other officers. The provost, who, from courtesy, is still called lord provost, is justice of the peace for both the burgh and the county. He holds his office during three years, and is re-eligible. The baillies exercise a jurisdiction in case of crimes and misdemeanours committed within the burgh not touching the life of the offender. Glasgow returns two members to parliament.

The southern part of the city, adjoining the Clyde, is situated on a tract of low land which becomes more elevated towards the north. It is regularly built; the greater part of the streets are sixty feet wide, and intersect each other at right angles; the houses, which are of stone, covered with slate, have an elegant appearance; and the squares, of which there are four, are tastefully planted with a variety of shrubs; and one of them, George Square, contains many honorary statues.

The cathedral, or high church, dedicated to St. Kentigern, stands on the highest part of the city, and is considered the most perfect specimen of Gothic ecclesiastical architecture remaining in Scotland. It was commenced in 1123, by John Achaius, bishop of Glasgow; rebuilt in 1197, and completed in 1223–1260. Beneath it is a fine crypt. The cathedral is now (1848) undergoing a thorough repair. The churches of St. Enoch, St. Andrew, and St. David are also fine buildings. The other public buildings which merit particular mention are the Royal Exchange, Royal Bank, Royal Infirmary, old and new Lunatic Asylums, the University, Railway Stations, the Hunterian Museum, the new Astronomical Observatory, and the Municipal and Judicial Courts. The Green of Glasgow, which Camden calls 'a public washhouse,' is now a fine park, stretching along the north bank of the river, and comprising upwards of 130 acres. The principal burying-ground is in imitation of Père la Chaise at Paris.

Till 1775 the Clyde was only navigable by vessels of very small burthen; but since that time large sums have been expended in its improvement, the banks have been widened, the bed deepened, and the numerous sand-banks and other obstructions to the navigation have been removed. There are now quays on both banks nearly a mile in length. Vessels drawing 14 feet of water can come up close to the lowest bridge. The revenue derived from the harbour in 1847 was 54,000*l*. Port Glasgow, situated 14 miles down the Clyde, belongs to Glasgow, and is governed wholly by the Glasgow magistrates. The river is crossed by four bridges; the oldest was built by Bishop Rae in 1350.

Glasgow is connected with the Atlantic by the river Clyde, and communicates with the North Sea and German Ocean by means of the Forth and Clyde Canal. Prior to the union in 1707, its commerce was limited to France and Holland, and consisted principally in the curing and exportation of salmon; but after that it entered so extensively into the trade with Virginia and Maryland, that before the commencement of the American War in 1776, which suspended the tobacco trade, the annual imports exceeded 50,000 hogsheads. At the present time the trade with the United States and the West Indies, and the timber trade with North America, are carried on upon a very large scale. The customs duty in 1845 amounted to 600,000*l*. There are about 80,000 tons of iron, and 130,000 tons of coal exported annually from the Clyde. The ships which were owned by Glasgow houses in 1846 amounted to 512, with a tonnage of 135,000 tons. The burden of the vessels which arrived and departed at Glasgow in 1846 was 1,120,000 tons.

Glasgow is also quite as much a manufacturing as a commercial town. With the exception of some large establishments near Aberdeen and Stirling, almost the entire cotton manufacture of Scotland is confined to Glasgow and the country surrounding it to the extent of 25 miles. The manufacture of linens, cambrics, &c., was first introduced into Glasgow about 1725, the power-loom in 1793, and at the present time the nu-

merous establishments for weaving and spinning are on the most splendid scale. But, although the cotton manufactures have hitherto constituted the staple trade of Glasgow, those of iron become annually of greater extent; and from the peculiarly advantageous position of the town, in a mineralogical point of view, Glasgow is becoming more and more the centre of an iron district, especially since the introduction of the hot-blast in the iron manufacture. The quantity of pig-iron alone, sold in Glasgow in 1846, exceeded 600,000 tons. There were 141 iron-smelting furnaces in Lanarkshire, around Glasgow, in 1846. Shipping and steam engines are among the important manufactures of Glasgow.

Glasgow is the centre of a very extensive system of railways, which radiate from it in every direction.

The population of Glasgow has increased at a very rapid rate. It was only 14,000 in 1651; in 1811 it had increased to 112,330; in 1821 to 150,818; in 1831 to 207,393; in 1841 to 274,533; and it is supposed that the present population, in 1848, does not fall far short of 350,000.

The University and College-buildings of Glasgow, situated on the east side of the High-street, consist of two squares separated by a handsome library. The University was founded by a bull of Pope Nicholas V., granted in 1450. In 1572, the college acquired some church property, and in 1577 James VI. made further additions to the endowments, and granted a charter which is the foundation of its present constitution. The officers of the University consist of a chancellor, a rector, a dean, a principal, the fellows, and the regius professors.

There is an institution, founded by Mr. John Anderson in 1795, and endowed by him with a library, museum, and philosophical apparatus. It was incorporated the following year, and placed under the superintendence of eighty-one trustees. The object of the founder was to give instruction to the operatives of Glasgow, free of expense, by means of popular and scientific lectures in natural philosophy, and the institution has already been productive of the happiest effects on a valuable class of society. There is a mechanics' institution, which was founded in 1823. The grammar-school of Glasgow is of remote antiquity. There are two normal schools, one belonging to the Scotch Church, and one to the Free Church. There are many book societies and circulating libraries. The benevolent institutions of Glasgow are very numerous.

(Camden; *New Statistical Account of Scotland;* Dr. Cleland; M'Culloch's *Statistical Account of Great Britain; Parliamentary Papers,* &c.)

GLASS, a transparent and impermeable substance, exceedingly brittle while cold, but which, by the application of a high degree of heat, is rendered so flexible and tenacious that it may with the utmost facility be moulded into any form. It is so ductile while heated, that it may be spun into filaments of the greatest conceivable fineness, and these when cold are pliant and elastic in a high degree. The time at which glass was invented is very uncertain. The ancient Egyptians were certainly acquainted with the art of glass-making. The manufacture of glass was long carried on at Alexandria, from which city the Romans were supplied with that material; but before the time of Pliny the manufacture had been introduced into Italy, France, and Spain (xxxvi. c. 26). Glass utensils have been found among the ruins of Herculaneum. The application of glass to the glazing of windows is of comparatively modern introduction.

The earliest manufacture of flint-glass in England was begun in 1557, and that of plate-glass in 1673. The manufacture was incumbered with an excise duty for more than a century. The principal seat of the manufacture in England is at Newcastle-upon-Tyne and the neighbouring town of Shields; next in importance is Stourbridge; then the works in and near Liverpool, including the Plate-glass Company's establishment at Ravenhead; next follow Bristol, Warrington, Birmingham, Leeds, and London. There are several manufactories in Scotland and Ireland.

There are five distinct kinds of glass, which differ from each other in regard to some of the ingredients of which they are made, and in the processes of manufacture. These kinds are flint-glass, or crystal; crown-glass, or German sheet-glass; broad-glass, or common window-glass; bottle-glass; and plate-glass.

The principal ingredients used for the production of each of these kinds of glass are silex, or flint, or sea-sand, and an alkali. The differences in the various kinds result from the description of alkali employed, and from the addition of certain accessory materials, usually metallic oxides. The alkali employed for making fine flint-glass is purified pearl-ash. Barilla, kelp, and wood-ashes, combined with many impurities, are used for making inferior kinds of glass: the impurities even assist towards fusing the silex. Coarse alkaline substances all contain iron in some degree, and it is to the presence of this metal that the green colour of common glass is owing.

Flint Glass, known in other countries under the name of crystal, is the most generally useful, the most brilliant, and the heaviest description of glass. The following is one among many ratios of ingredients:—

120 parts fine clean white sand,
40 „ well-purified pearl-ash,
35 „ litharge, or minium,
13 „ nitre; and a small quantity of the black oxide of manganese.

The litharge is employed to assist the sand to melt; nitre is used to dissipate carbon, and manganese to dissipate colour.

The ingredients must all be intimately mixed together before they are put into the crucibles, or pots, which are previously placed in the furnace. A very strong and long-continued heat is necessary, not only for the perfect fusion and amalgamation of the materials, but also for the discharge of the impurities which they contain. The glass is cooled down to a pasty mass, and then wrought. There is perhaps no process of manufacture which excites so much the surprise and admiration of a

stranger as that of fashioning flint-glass into all the various objects of convenience and ornament for which it is employed. To see a substance, proverbially brittle, blown with the human breath, pulled, twisted, cut, and then joined again with the greatest facility, never fails to strike with astonishment those who are unaccustomed to the sight. The tools with which all these operations are performed are of the most inartificial description, and do not appear to have received any improvement from the earliest records of the manufacture.

Crown Glass.—This is the best description of window-glass; and one recipe for it is:—

120 parts white sand,
60 „ purified pearl-ash,
30 „ saltpetre,
2 „ borax,
1 „ arsenic,

with the addition of a minute quantity of manganese. Crown-glass is made by blowing, in the form of circular plates of 50 to 60 inches diameter. A quantity of glass in the pasty state is collected upon the end of a hollow iron tube; and this glass is then converted, by blowing through the tube, into a hollow globe of the requisite substance. This globe is transferred to the end of a rod, and after several re-heatings it is twirled round by the workman somewhat in the manner that a mop is twirled to drive off the moisture; with this twirling the softened material is continually driven off from the centre by the centrifugal force, until at length the whole substance is converted into a flat disc of circular form, and, except at the centre, where it is attached to the rod, of a uniform thickness.

Broad Glass is an inferior kind of window-glass, made with a cheaper kind of alkali. It is blown to a cylindrical form, cut open, and spread into a flat plate.

Bottle Glass is still inferior in quality to broad-glass, the alkali employed being the cheapest that can be procured, with the addition of a portion of lime to assist fusion. Bottle-glass is fashioned by blowing into hollow moulds.

Plate Glass is both blown and cast. The following proportions and ingredients are given by Parkes:—

Lynn sand, well washed and dried	720 parts.
Alkaline salt, containing 40 per cent. of soda	450 „
Lime, slaked and sifted	80 „
Nitre	25 „
Broken plate-glass	425 „
	1700 parts.

It requires 40 hours' exposure to the full heat of the furnace to reduce the materials to the proper state of fusion and vitrification. When this is accomplished, the glass is transferred from the melting-pot to a large vessel called a *cuvette*, and from this to a large casting-table, where it is distributed by means of a roller over the whole surface of the table, bars of metal being placed at each side along its entire length, and across the bottom, in order to prevent the glass from running upon the floor. The casting of large plates of glass is one of the most beautiful processes in the arts: the large mass of melted glass, rendered in a high degree luminous by heat, exhibits changing colours in the sheet after the roller has been passed over it.

When annealed, which all glass requires to be before using [ANNEALING], the plates of glass are ground with powdered flints, and then with emery powder, and are afterwards polished with oxide of iron laid upon woollen pads. Plate-glass is silvered for looking-glasses with an amalgam of mercury and tin-foil.

Artificial gems, familiarly known under the name of *paste*, are glass, into the composition of which a large proportion of metallic oxide enters, such proportion being in almost all cases greater than that of the silex with which it is combined.

Since the removal of the glass duty, in 1846, it is not known how much glass has been made in the United Kingdom. There was excise duty paid upon 110,900 cwts. of glass of all kinds in 1845, producing a revenue of about 115,000*l.* The declared value of the glass of all kinds exported in 1846 was about 260,000*l.* The average value of all the various kinds was almost exactly 1*l.* per cwt.

GLASS-PAINTING is practised as follows:—The design having been first drawn on paper, the glass is laid thereon, and the outline traced with a coloured fusible glass. The parts intended to be yellow, orange, or red, are then coated, either on one or both sides, according to the tint required, with a mixture composed of silver, antimony, and oxide of iron. The glass is then exposed to a red heat, in which process the tracing-colour is fused, and adheres permanently to the glass. The mixture of silver and antimony stains the glass, but does not melt, so that the oxide of iron, which is in the state of dry powder, may be brushed off, leaving the glass coloured, but as transparent as before. The other colours, composed, as for enamel [ENAMEL], of a very fusible glass coloured with metallic oxides, are then added, and the glass is again fired. In subjects which are too large to be executed in one piece, the joinings are carefully arranged to run in the outline; and for draperies, &c. the artist avails himself of glass already coloured in the manufacture (pot metal), and which requires shadowing, diapering, &c.

In painting glass, the colours applied remain on the surface of the glass, and interfere with its transparency. In staining glass, the colour sinks into the glass a very small distance, but leaves it as transparent as before: the only colours which can at present be stained are yellow, orange, and red. There are two modifications of painting or staining on glass, called melting and embossing, produced by special chemical means.

GLASS, JOHN, founder of the sect of Glassites in Scotland, was born on the 21st of September, 1695, at Auchtermuchty. He studied at St. Andrews and Edinburgh, and in 1719 became minister of Tealing near Dundee, where he soon made himself popular. He was deposed by the church courts 12th April, 1728, for attacks on the Solemn League and Covenant, &c.; but the general assembly, on reconsideration, whilst depriving him

of his benefice, left him his ecclesiastical character. Having removed to Dundee, he there formed a sect, whose tenets appear to relate to a spiritual union which binds the members in one body as a church, without its being represented by an outward ecclesiastical polity. He died in 1778.

GLASTONBURY. [SOMERSETSHIRE.]

GLATZ. [SILESIA.]

GLAUBER, JOHANN RUDOLPH, was born at Karlstadt, in Germany, in 1604, and died at Amsterdam in 1668. Though an alchemist and a believer in the universal medicine, he endeavoured to improve chemical processes and the arts to which they are applied. One of his most important discoveries is that of the salt which yet bears his name, and he greatly improved the processes for obtaining nitric and muriatic acids, and many other chemical substances. He did much in improving and inventing chemical apparatus, some of which are described and depicted in his works, 'Opera Chemica,' 2 vols., Frankf., 1658, which have been translated into English by C. Packe, fol.

GLAUBER, JOHN (called *Polidore*), born at Utrecht in 1646, studied painting under Nicholas Berghem, and spent some years with a picture-dealer. He was also a year at Paris with Picart, a flower painter, and two years at Lyon, with Adrian Van der Cabel. He then went to Rome; spent two years there; and he was as long at Venice. Thus prepared, he settled at Amsterdam, and formed a friendship with G. Lairesse, who often enriched Glauber's landscapes with elegant figures. Glauber is one of the finest Flemish landscape painters. His taste, manner, and most of his scenes, are Italian. Many of his works are in the style of G. Poussin. He died at Amsterdam, in 1726, aged eighty.

GLAUBER SALT occurs as a mineral body. It is found as an efflorescence, and also crystallised; the primary form is an oblique rhombic prism; whitish, translucent, and having a cool bitter taste. It is a hydrated sulphate of soda.

GLAUBERITE, a mineral which occurs massive and also crystallised in rock salt. The primary form is an oblique rhombic prism. It is yellowish, translucent, and slightly saline. It is a double sulphate of soda and lime.

GLAUCHAU. [SCHÖNBURG.]

GLAUCIUM, a genus of plants belonging to the natural order *Papaveraceæ*. The juice of the species is said to be poisonous. The flowers are yellow or crimson, and the English name of the genus, Horn Poppy, originates in the horn-like shape of the pods. *G. luteum*, Yellow-Horned Poppy, has flowers of a golden yellow colour. It is found on the sea-shores of Great Britain, and also in the Carolinas and Virginia. *G. phœniceum* is regarded by De Candolle as a variety of *G. corniculatum*. It is a native of the South of Europe, and is occasionally found on the coast of England. It is however considered by Babington to be a doubtful native. The flowers are crimson, and have an elegant appearance.

GLAUCOLITE, a crystalline mineral, of a blueish green colour, and translucent. It consists chiefly of silica, alumina, and lime.

GLAUCO'MA (from γλαυκός, blue or blueish gray), a disease of the eye, characterised by the pupil losing its naturally black colour, and presenting a clear or dull greenish hue. It was first described by Brisseau, partly from observations made in the post-mortem examination of the eyes of Bourdelot, physician to Louis XIV. It seems to depend essentially on disease of the choroid membrane and retina, generally combined with morbid alteration in the vitreous humour and hyaloid membrane, and in the lens and its capsule.

On examination of the eyes thus affected, the choroid membrane is found to have lost its black colour from the absence of pigmentum nigrum; it is become dull-brownish, and its vessels are often varicose; the vitreous humour is generally quite fluid without a trace of hyaloid membrane, of a yellowish hue, or with small brownish green or green spots scattered through it; the retina is often darker than natural, or marked with reddish or black points; the lens in part of a yellowish or deep amber colour, firm and transparent, sometimes pushed forward, so that the iris is in contact with the cornea. This disease seems to consist in a chronic inflammation of the deep-seated structures of the eye.

Early treatment is necessary, and it should be actively antiphlogistic; blood should be drawn from the temples, and purgatives, mercury, and abstemiousness be ordered. If however the pupil becomes quite green and the iris motionless, the case may be regarded as hopeless; for there are no means known by which the causes on which these symptoms depend can be removed.

GLAUCO'PIS, a genus of birds belonging to the family CORVIDÆ, established by Forster (*Calœas* of Bechstein and Vieillot). Locality, Africa, the islands of the Pacific, and Cochin China.

Generic Character.—Bill moderate, strong, robust, thick, with the base enlarged towards the commissure; upper mandible convex, vaulted, curved towards the end and without any notch; lower mandible following the curvature of the upper, straight below, hidden in part by the sides of the upper mandible. Nostrils basal, lateral, round, partially closed by a large membrane, and entirely hidden by the curled and velvety feathers which advance from the forehead. Feet strong, robust; tarsi longer than the middle toe; toes nearly all of a length, the external toe united to the middle one, and the internal toe soldered ('soudé') at the base. Wings short; the first quill short, the three following graduated, and the fifth longest. Tail long, graduated. (Temminck.) The above character is adopted in Lesson's 'Manuel,' and the following three species are there arranged under the genus, viz. *Glaucopis cinerea*, *Gl. leucoptera*, and *Gl. temnura*.

M. Temminck observes that the striking character in *Gl. temnura* consists in a very graduated tail, all the feathers of which are truncated and cut, as it were, transversely at their extremity. The plumage is black, a little lustrous on the wings and tail. Bill and feet black. Total length, 12 inches. Locality, Cochin China. M. Lesson observes that this species will form a new genus.

(Swainson's *Classification of Birds*, 1837, vol. ii.)

GLAUCUS (Zoology), Forster's name for a genus of Mollusks, placed by Cuvier among his *Nudibranchiata;* by De Blainville under his *Polybranchiata* (family *Tetracerata*); and by Rang made the type of a family, *Les Glauques* (*Glaucidæ*), which together with *Glaucus* comprises the genera *Laniogerus* (De Blainville), *Briarœa* (Quoy et Gaimard), *Eolidia* (Cuvier), *Cavolina* (Bruguières), and *Tergipes* of Cuvier.

Generic Character.—Animal pelagian, gelatinous, elongated, slightly flattened, and terminated backwards in a point. Foot very narrow, and almost rudimentary. Head distinct, furnished with four very short, flattened, and triangular tentacula; the mouth subterminal. Branchiæ disposed in pairs on the sides, and fitted for swimming, being formed by oblong processes surrounded by digitated appendages. Termination of the organs of generation in a common tube, at the anterior part of the right side; vent on the same side, more backwards. (Rang.)

M. Deshayes, in his edition (1836) of Lamarck (who made *Glaucus* the first genus of his family *Tritonians*), remarks that, notwithstanding the researches of several accomplished naturalists, there still exists uncertainty as to many points of the anatomy of this genus. M. Deshayes points out the necessity of new researches as to the organisation of these animals, and states that the majority of naturalists are now convinced that, as yet, but one species is known. The figure given by Messrs. Quoy and Gaimard ('Voy. de l'Astr.,' Zool. t. 2, pl. 21, f. 6 to 14) conveys a good idea of this elegant animal. (See also 'Proceedings of the Zoological Society,' 1836, p. 113, for some valuable observations on *Glaucus*, by G. Bennett, Esq.)

GLAUX, a genus of plants belonging to the natural order *Ranunculaceæ*. It has a coloured calyx without any corolla. There is but one species of this genus. *Glaux maritima*, the Black Saltwort, grows on the sea-shore and salt marshes, and is a native of Great Britain.

GLAZING, the art of fixing glass in the frames of windows, &c. Putty, with which the glass is usually fixed, consists of whitening and linseed oil. [Diamond, Glaziers.]

GLAZING. [Earthenware; Pottery.]

GLEANING. The practice of gleaning in corn-fields what the reapers of the harvest leave behind is vulgarly supposed to be a legal custom which the 'owner or occupier of the field has no right to prohibit, and that the poor who enter a field for this purpose are not guilty of trespass;' but the only authority in support of this view is an extra-judicial dictum of Lord Hale. Blackstone, in his 'Commentaries,' book iii. c. 12, remarks that this humane provision seems borrowed from the Mosaical law (Levit. xix. 9, and xxiii. 22, &c.), and apparently adopts Lord Hale's opinion. The question has, however, twice been tried in the Court of Common Pleas, and it has been properly decided that a person can claim no such right. (1 H. Bl., 'Rep.' 51, quoted in Christian's ed. Blackst., 'Com.,' vol. iii. p. 213.)

The general custom in all parts of England is to allow the poor to glean, in some cases before the harvest is carried, but more generally perhaps not until afterwards.

GLEBE LAND, the portion of land which belongs to a parish church. If there be both a rector and a vicar, the glebe land in the occupation of either does not pay tithes, though if in the occupation of a tenant it does. The representatives of a deceased incumbent are entitled to the corn sown by him on the glebe. Various statutes have from time to time been passed to facilitate the exchange of glebe lands, which are often scattered in small parcels in different parts of the parish. It is doubtful whether a parson may open mines upon his glebe, though he may work any that are open.

GLEDITSCHIA, a genus of plants belonging to the natural order *Leguminosæ* and the sub-order *Cassieæ*. *G. triacanthos*, the Three-Horned Acacia or Honey Locust, is a large tree, native of the Carolinas and Virginia, and attaining a height of from 50 to 80 feet. When the tree is young, the trunk and branches are covered with small prickles, which become hard as it increases in age, and form a formidable defence. The foliage is of a light shining green, and is particularly elegant. In the neighbourhood of London the leaves do not appear till late in the spring, and drop off early in the autumn. The seeds are covered with a sweet pulp, which, when infused and fermented, forms an intoxicating liquor which was used by the American Indians. *G. monosperma*, the One-Seeded Gleditschia, is a native of the Carolinas, Florida, and Illinois, in damp woods. It attains a height of from 60 to 80 feet, and much resembles the former species. When none of the seeds ripen, it is impossible to distinguish them. There are 8 species of Gleditschia enumerated, all of which possess the same general characters. As ornamental trees they are much esteemed, both on account of their elegant foliage and the varied and picturesque forms assumed by the tree, together with the singular appearance of the spines. They require a deep rich soil in a situation not exposed to high winds.

GLEE, in Music, a vocal composition in three or more parts. The Glee is of English growth, though the Madrigal seems to have been its parent. The term is confined exclusively to this country, and does not appear to have been employed till towards the latter part of the seventeenth century, though compositions similar to glees were known earlier. The most distinguished deceased authors of this delightful species of music are—Arne, Baildon, Callcott, Cooke, Danby, Hayes, Mornington, Nares, Paxton, Spofforth, Stafford Smith, Stevens, and Webbe.

GLEICHENIACEÆ. [Filices.]

GLEIM. [Germany—*Language and Literature.*]

GLENDWR, OWEN, was born in Merionethshire about the year 1349. He was maternally descended from Llewelyn, the last Prince of Wales. He studied law in one of the inns of court, London, and became a barrister. Next we find him squire of the body to Richard II., with whom he was taken prisoner at Flint Castle. He was knighted in 1387. By his wife Margaret, daughter of Sir

David Hanmer, of the county of Flint, he had several sons and five daughters: most of the sons were slain in the field of battle to which they accompanied their father in 1400.

Taking advantage of the deposition of Richard, Lord Grey de Ruthyn seized by force a piece of land which Owen had previously recovered from him by due course of law. Owen laid his case before parliament, but his suit was dismissed. Lord Grey next detained the writ of summons calling upon Owen, with the other barons, to assist Henry IV. in his Scottish expedition, made the king believe that Owen's absence was intentional, and seized his lands, under pretence of forfeiture. The Welsh, who hated the English for their oppression, and for those laws which punished their bards as vagabonds, now rose in support of Owen, who proclaimed his genealogy, and laid claim to the throne of Wales. In the summer of 1400 he attacked and seized the estates of Lord Grey, while he was absent; but who, with Lord Talbot, being sent by the king, retaliated by attacking Owen's house, whence he with difficulty escaped. Owen then assailed and burnt the town of Ruthyn, and so alarmed the king, that the latter assembled a regular army, and marched in person against him, after having granted all his estates to John, earl of Somerset, the king's brother, to quicken the interest of that powerful nobleman in the destruction of Glendwr. Henry however retired, after Glendwr had retreated to the mountains in the neighbourhood of Snowdon. After much skirmishing, burning, and plundering, Owen took the castle of Radnor. Soon after he was suddenly surrounded by 1500 Flemings, who were then settled in Pembrokeshire; but he broke through them, and left 200 of them dead on the field. A second expedition, headed by the king, in June 1401, was again unsuccessful; the army retreated exhausted by famine and disease, whilst Glendwr was daily becoming stronger and more popular. A comet in 1402 was interpreted by the bards as an omen in his favour. Glendwr advanced against Ruthyn, and, as Lord Grey came forward to resist the attack, he was seized in an ambush. and carried off to the camp near Snowdon. Lord Grey then paid 6666*l.* as ransom money, engaged to remain neutral, and married Glendwr's fourth daughter. Caernarvon Castle was then besieged, and Bangor Cathedral, and the cathedral, palace, &c., of St. Asaph burnt, on account of the disloyalty of Trevor, bishop of St. Asaph, to Richard II. Trevor himself subsequently joined Owen, and was confirmed by him in the see, till the decline of Owen's power, when the bishop withdrew to Paris.

Whilst the king was preparing a third expedition, Glendwr defeated Sir Edmund Mortimer at Pilleth Hill, in Radnorshire, killed 1100 of his followers, and made Mortimer prisoner. Mortimer was uncle to Edward Mortimer, earl of March, then about 10 years old, whose title to the English crown had been acknowledged by parliament, and who was kept in close custody by Henry IV. The uncle, who was left unransomed by the king, and was treated with great respect by Glendwr, became his confederate, and they drew into their alliance the powerful English family of the Percies. Possession of the entire kingdom was now aimed at. England south of the Trent was to belong to the young Earl of March, and north of that river to the Earl of Northumberland, whilst the district westward of the Severn was appropriated to Glendwr. The estates of Wales were called together at Machynlleth, and there Glendwr was crowned, and styled Prince of Wales.

In 1403 Glendwr and Mortimer marched towards Shrewsbury to join Percy's army; but before their entire junction King Henry arrived, and an engagement took place at Battle Field, near Shrewsbury, in which Percy fell. In the next year, the king secured the Welsh castles; whilst Owen, on his part, concluded a treaty of alliance with the French king, Charles VI., on the 14th of June, and immediately commenced a vigorous campaign, and took several castles, some of which he dismantled. In 1405 he made an unsuccessful attempt to set free the young Earl of March, in order that the English might be raised in his favour. In March 1405 he received a severe defeat at Grosmont Castle, from the young Prince of Wales, afterwards Henry V., then in his seventeenth year. Another defeat almost immediately followed in Brecknockshire, where one of his sons was taken, and his brother Tudor killed. All Glamorganshire then submitted; and Glendwr had for a time to conceal himself in secret and unfrequented places. But the French sent a fleet of 140 ships, which disembarked 12,000 men at Milford Haven; Caermarthen capitulated, and Glendwr was able to join the French at Tenby, with 10,000 men. The French however quitted the country without any important engagement having taken place, in consequence of the vigorous measures of the English in burning their ships, and preventing all supplies. Gradually from this time Owen's power decreased, though all efforts failed to destroy it entirely. Two of his best officers, Rhys Dhu and Philip Scudamore, were taken prisoners and executed in London. During the reign of Henry V. Sir Gilbert Talbot was empowered to negotiate a treaty with Owen and his followers; but the proceedings appear to have been interrupted by the death of Glendwr, Sept. 20, 1415.

GLIADINE, a peculiar azotised vegetable matter which exists in small quantity with the gluten of wheat, and to which its adhesive properties are owing. It may be separated by boiling alcohol, together with a thick fluid oil which is separable by ether. Gliadine is adhesive, and is insoluble in water. When dried, it is hard and translucent like horn; it dissolves in acetic acid and solution of potash.

GLIRES, the fourth order of *Mammalia* in the 'Systema Naturæ' of Linnæus, who thus characterises it:—Incisors (dentes primores incisores) two above and below; Canines (laniarii) none. Feet unguiculate; progression salient. Food obtained by gnawing the bark of trees, roots, vegetables, &c. This is the character given in the Synopsis of the *Mammalia*. In the course of the work the dental formula is thus stated:—Incisors two above and below, approximate, remote

from the molars; no laniarii. The genera placed by Linnæus under this order in his last edition are, *Hystrix* (Porcupines), *Lepus* (Hares, Rabbits, &c.), *Castor* (Beavers, &c.), *Mus* (Rats and Mice, Guinea-Pigs, Agoutis, Marmots, Lemmings, Hamsters, Dormice, Jerboas, the Paca, &c., and the American Flying Squirrel), *Sciurus* (the Squirrels), and *Noctilio* (one of the Bats).

GLISSON, FRANCIS, was born in 1597 at Rampisham in Dorsetshire; he was admitted at Caius College, Cambridge, of which he became Fellow, and after having graduated in medicine and been elected a fellow of the College of Physicians, was appointed professor of physic in the university of Cambridge, which office he held for about forty years. He was also president of the College of Physicians. His writings show marks of considerable power and originality of mind, and contain some valuable information both in anatomy and physiology; but, from his ideas having been obscured by the language of the Aristotelian philosophy, they have not met with that attention which they deserve. In 1654 he published an account of the anatomy of the liver. He anticipated Haller in pointing out that property of muscular fibre to which that physiologist gave the name of irritability. He distinguished accurately between perception and sensation, and gave as an instance of the former the action of the heart under the stimulus of the blood, or when removed from the body (that is to say, when stimulated by pricking, pinching, galvanism, &c.), and of the voluntary muscles when excited after death.

In addition to other original suggestions and theories, he described, for the first time, the disease called the rickets, which, as he states, made its appearance about thirty years before the date of his work (1650) in the counties of Dorset and Somerset, and by degrees spread to London, Cambridge, and Oxford, and the southern and western parts of England, but had scarcely then reached the northern parts of the island. He named the disease Rachítis, in imitation of the popular name it had obtained before it was described by any medical writer. His works are all written in Latin.

GLOBBA, a genus of scitamineous plants, indigenous in the tropical parts of Asia, especially in the islands of the Indian Ocean and the continent of India. It includes the genus *Mantisia*, which was so named from the resemblance of its flower to the Mantis insect; and the species *saltatoria*, commonly called Opera-Girls, from the supposed resemblance of the flowers to dancing figures.

GLOBE, the common term for a sphere, but most frequently used to signify the earth itself, or the sphere on which a representation of the earth or heavens is drawn.

GLOBE OF COMPRESSION, a name given by Belidor to mines in which the highest charges of powder are employed. Such mines have been used by the besiegers of a fortress to destroy the galleries of the counter-mines and blow the wall of the counterscarp into the ditch.

GLOBULAR PROJECTION. We believe this term has been applied to more than one species of map, but particularly to the projection proposed by Lahire, in which the eye is supposed to be distant from the globe represented in whole or part by one-half of the chord of an arc of ninety degrees. This projection gives but a small distortion, compared with that of the stereographic projection; it is however very rarely employed, on account of the projections of most of the great circles being ellipses.

GLOBULAR SAILING, a term of navigation, employed to denote the sailing from one place to another over an arc of a great circle, or the shortest distance between the two places.

GLOBULARIA'CEÆ, a very small natural order of Exogens, nearly allied to *Dipsaceæ* and *Asteraceæ*. The species inhabit the hot and temperate parts of Europe, and usually possess bitter, tonic, and purgative properties.

GLOGAU. [LIEGNITZ.]

GLORIO'SA, a genus of the natural family of *Liliaceæ*, tribe *Tulipaceæ*, so named from the splendid appearance of its flowers. One species, *G. superba*, is indigenous in most parts of India, with a species or variety, *G. simplex*, at moderate elevations on the Himalayas, while *G. virescens* is a native of Senegambia.

GLOSSARY. [DICTIONARY.]

GLOTTIS. [LARYNX.]

GLOSSOPETRA (*γλῶσσα, a tongue*, and *πέτρα, rock*), the name by which many early inquirers into the history of organic remains designated a great number of fossil teeth of fishes allied to the shark, which are found abundantly in the upper secondary and tertiary strata of England, France, Germany, Italy, &c. They were also called *Lamiodontes Odontopetræ*, &c.

Amidst the difficulties which embarrassed the naturalists of the sixteenth century in their attempts to establish the true nature and origin of the organic remains of plants and animals found in the earth, the obvious resemblance between the fossil and recent teeth of fishes was a valuable and powerful argument. Fabio Colonna ('De Glossopetris Diss.,' 1627) and Agostino Scilla ('La vana Speculazione,' &c., 1670) pointed out the close agreement, in several cases, between the fossil teeth of Malta, Calabria, &c., and the teeth of living sharks; and the argument from similarity of form was made complete by considerations of the peculiar polish, hardness, chemical quality, and even colour of the fossil specimens. Scilla's figures are excellent. Ray, in a letter to Dr. Robinson (1684), makes the same use of the Glossopetræ.

The following short synopsis may be convenient to collectors (see also Dr. Buckland's 'Bridgewater Treatise):—

Family of Sharks.—Group 1. Cestracionts. (*Siliquastra, Rhombiscus*, &c. of Llwyd.) Teeth having a broad grinding surface. 2. Hybodonts. (*Plectronitæ* and *Glossopetræ* of Llwyd.) Teeth pointed, striated on both sides. 3. True Sharks. (*Glossopetræ* of Scilla, Llwyd, &c.) Teeth triangular, striated on one side only.

Many of the *Bufonitæ* of old writers belong to the extinct genera *Pycnodus* and *Gyrodus* of Agassiz.

The geological distribution of these fish-teeth is curious. Llwyd mentions that scutellate ichthyodontes had not occurred to him in the maritime regions of England, but were found not less plentifully than the cuspidate kinds in the interior counties, as Oxford, Northampton, Gloucester, Berks, Bucks, &c. This is in agreement with conclusions of later date, for M. Agassiz has found that the whole group of Cestracionts is confined to strata of the transition and secondary series; while only one of the race (*Cestracion Phillippi*, or Port Jackson Shark), is now living.

Dr. Buckland ingeniously remarks, that 'the greater strength and flattened condition of the teeth of the families of sharks that prevailed in the formations beneath the chalk had relation, most probably, to their office of crushing the hard coverings of the Crustacea, and of the bony enamelled scales of the fishes which formed their food.' ('Bridgewater Treatise.')

GLOUCESTER, a city, county of a city, and the capital of Gloucestershire, is in 51° 50′ N. lat., 2° 16′ W. long., 104 miles W.N.W. from London, direct distance, or 114 miles by the Great Western Railway. It is pleasantly situated upon a gentle eminence which rises on the eastern bank of the Severn, about a mile above the confluence of the two channels into which that river is divided by the island of Alney, and about 40 miles above its junction with the Bristol Channel. The origin of this city is generally attributed to the Britons. Shortly after the invasion of Britain under the Emperor Claudius, A.D. 44, the city became subjected to the Romans, who established a colony here as a check upon the Silures, or inhabitants of South Wales, and called it Colonia Glevum. The city continued in the possession of the Romans up to the period of their leaving the island. It subsequently surrendered to the West-Saxons about the year 577, and by them was called *Gleau-Cester*.

The main streets of the city are at right angles to one another, and are lighted with gas. The water for the supply of the inhabitants is partly drawn from the Severn, and partly from springs situated near Robin Hood's Hill, about two miles distant from the town. Of the public buildings, the cathedral is particularly deserving of notice. The most ancient parts are the crypt, the chapels surrounding the choir, and the lower part of the nave, built between 1058 and 1089, the south aisle and transept in 1310–1330, the cloisters in 1351–1390, and the Lady Chapel towards the close of the fifteenth century. The fine Gothic tower, surmounted by four pinnacles of the most delicate workmanship, is of somewhat more recent date. The choir, owing to the great elevation of the vault, the richness of the design, and the elaborate tracery of the eastern window, is an exceedingly fine specimen of the florid style of architecture. The extreme length of the cathedral is 427 feet; extreme breadth, 154 feet; height of the tower, 223 feet; length of the nave, 160 feet; height of the nave, 68 feet.

The town-hall is a fine building with a portico of Ionic columns, erected by Robert Smirke in 1814. The county gaol occupies the site of the ancient castle, and consists of a penitentiary, bridewell, and sheriff's prison. There is also a city gaol. In 1821 a very commodious market was constructed.

There are two stone bridges, each of a single arch, over the two channels of the Severn. These are connected by a paved road, called Over's Causeway, which extends through the rich pasture land of Alney Island. The manufactures of Gloucester were formerly much more extensive than at the present time, especially pin-making. The town however is in a flourishing state, and is surrounded by a large and most fertile district. It has a water communication with most parts of the kingdom, and the improvements in the navigation of the Severn, by the completion of the Gloucester and Berkeley Canal, have added considerably to its foreign and domestic commerce. The Bristol and Birmingham Railway passes through Gloucester, and a branch railway passing through Stroud connects Gloucester with the Great Western Railway. There are three endowed schools, viz. the college school, the blue-coat, and the free grammar school of St. Mary de Crypt. There are numerous other schools. Among the many benevolent institutions are several hospitals of ancient foundation, the county infirmary, supported by voluntary donations, and a lunatic asylum.

The city of Gloucester is a municipal borough, divided into 3 wards, and governed by 6 aldermen and 18 councillors. Population of the city, 14,152. The parliamentary borough, which returns two members, is nearly coincident with the municipal borough. Population, 14,497.

The bishopric of Bristol is now united with that of Gloucester, thus forming the bishopric of Gloucester and Bristol.

GLOUCESTER, ROBERT OF, a metrical historian, whose 'Chronicle' was ably edited by Hearne, at Oxford, in 1724. He is presumed to have been a monk in Gloucester Abbey. His surname is unknown; and, as several of his contemporaries called themselves Robert of Gloucester, his real history cannot be discovered. He is considered the most ancient of our English poets, and appears to have died some time in the reign of Edward I. The prose continuation of his history, which follows the metrical version, is a composition as late as the time of Henry VI.

GLOUCESTERSHIRE, an inland county of England, is bounded E. by Oxfordshire, N. by Warwickshire and Worcestershire, W. by Herefordshire and Monmouthshire, and S. by Somersetshire and Wiltshire. Detached portions of the county are situated within Wiltshire, Warwickshire, and Oxfordshire. The greatest length, N.E. to S.W., is 60 miles; the greatest breadth, E. to W., is 43 miles. The area is 1258 square miles, or 805,120 acres. The population, in 1841, was 431,383.

Surface, Hydrography, &c. — The county is naturally divided into three districts, the Hill, the Vale, and the Forest districts. The Hill district is formed by a range of high land, the Cotswold Hills, running entirely through the county from north-east to the south and south-west. Its course is nearly parallel to the Avon and Severn, at a distance varying from six to ten miles, and it

divides the basin of the Severn from the basin of the Thames. The Vale district lies between the hills and the Severn, and is divided into the Vales of Gloucester and Berkeley, together about 40 miles in length. The Forest district lies west of the Severn; it has an irregular surface, and is chiefly occupied by the Forest of Dean, great part of which is still crown property. Many encroachments or grants of freehold property have been made on it from time to time; but the quantity of ground still retained by the crown is above 20,000 acres, which grows timber fit for the royal navy. The government of the forest is vested in a lord warden, who is constable of the castle of St. Briavel's; six deputy wardens, four verderers chosen by the freeholders, a conservator, seven woodwards, a chief forester in fee, and bowbearer, eight foresters in fee, a gaveller, and a steward of the swainmote. These officers hold judicial courts; and the inhabitants have free liberty of pasturage, the privilege of sinking mines, and access to the woods and timber for their works. One-sixth of the produce of the mines is due to the king.

The principal rivers in Gloucestershire are the Severn, the Wye, the Lower and the Upper Avon, the Frome, the Isis or Thames, the Calne, the Windrush, and the Ledden. The Severn enters the county from the north a little to the west of Tewkesbury, and has a course of 60 miles to the Lower Avon, where it leaves the county; it incloses a small tract called Alney Island, near Gloucester; it has a tidal rise of 42 feet opposite the Lower Avon. The Lower Wye bounds a portion of the county on the west. The Upper Avon has a small portion of its course in this county. The North Frome flows through Bristol, and forms a part of the harbour. The Ledden passes through this county about 16 miles, from Donnington to Alney Island. The Stroud rises near Brimpfield, passes on to Stroud, and joins the Severn 7 miles south-west of Gloucester. The Calne rises near Cheltenham, and joins other tributaries of the Thames at Lechlade. The Leach and the Windrush are small rivers. The Thames in the upper part of its course is often called the Isis. [THAMES.]

There are several canals in Gloucestershire. The Thames and Severn Canal connects the two great navigable rivers. It commences at Lechlade, and joins the Stroudwater Canal at Wallbridge, near Stroud; its length is about 30 miles; it has a tunnel at Sapperton $2\frac{3}{8}$ miles long. The Stroudwater Canal commences at the Severn, near Framilode, and terminates in the Thames and Severn Canal at Wallbridge; its length is 8 miles. The Hereford and Gloucester Canal is open from Gloucester to Ledbury, 18 miles. The Gloucester and Berkeley Canal, by which the navigation up to Gloucester is shortened $11\frac{1}{2}$ miles, extends from Gloucester to the Severn near Berkeley, $16\frac{1}{2}$ miles.

Portions of the Midland Railway and of the Great Western Railway pass through this county; and other portions are sanctioned by recent Acts of Parliament.

Geological Character.—The whole range of the Cotswold belongs to the lower division of the oolitic series. The great oolite forms a flat tableland on the summits; and on the western escarpment beds of fullers' earth, inferior oolite, and marly sandstone occur. The whole of the Vale district rests on the lias formation. The south-west corner of the county is occupied by the coal-field. The whole of the Forest of Dean is a coal-field encircled by an elevated border of carboniferous limestone and old red sandstone.

The fossils of this county are extremely numerous, and are found both in the hills and the vales. Iron appears to have been wrought here during the Roman occupation; and we find it recorded in the reign of Edward I. that there were then 72 furnaces for smelting iron in the Forest. The iron ore here is not very rich in metal, and it is now therefore comparatively little worked. Two hundred pits have been opened for the coal in different parts of the Forest, but the coal is not considered so good as that of Staffordshire. Lead-ore is found in many parts of the county, but not in sufficient quantities to defray the expense of working. Pyrites, or sulphuret of iron, has been found in great abundance. Lapis calaminaris, petrosilex, barytes, quartz crystals, gypsum, limestone, and freestone are met with in the county.

Manufactures.—These are numerous and important. The cloth manufacture is extensively carried on at Wotton-under-Edge, Stroud, Minchinhampton, Bisley, Uley, Norsley, Cam, Painswick, Rodborough, and King's Stanley. At Frampton-Cotterell, Winterbourn, Bitton, and Westerleigh, there are considerable hat and felt manufactories, and some persons are also engaged in stocking-making. The last-mentioned manufacture is extensively pursued at Tewkesbury, where frame-making likewise gives employment to some of the inhabitants; some of them are likewise engaged in lace-making. In Gloucester and in the suburbs of Bristol there are pin manufactories. At Newland and English Bicknor tin-plates are made. Edge-tools are made at Cooley; and glass-bottles in the suburbs of Bristol. At Moreton and a few other places cheese-cloths and other articles of linen are made. The large commercial city of Bristol has also several manufactories, and works in brass, iron, floor-cloths, lace, hats, soap, vinegar, &c.

Climate and Agriculture.—The climate of Gloucestershire varies according to the elevation of the land. In the valleys the temperature is mild. On the Cotswold Hills, the air is sharp and bracing. The Vale of Gloucestershire is noted for the early maturity of every kind of agricultural produce, owing partly to the nature of the soil, but chiefly to the shelter afforded by the hills on the north and east.

The soil on the Cotswolds is chiefly a calcareous sand, a few inches deep, resting on oolite. The poorest is only fit for sheep-pasture; but the feed is very sweet, and the sheep thrive well on it. Where it has been improved by cultivation, it bears tolerable crops of oats and barley. The lower parts of the hills, and the valleys which are between them, contain a better and a deeper soil. The Vale has mostly a deep and rich soil. The Forest, where the soil is chiefly a decomposed red sandstone, is very barren, and scarcely fitted for the growth of anything but woods and coppice.

The cultivation of the soil varies according to

its nature and fertility. Two or three crops and a fallow are still the prevalent rotations on all the heavier lands. Turnips have been long the substitute for fallows on the lighter soils. On the best managed light-land farms, the rotation is turnips, barley, clover, and grass mown, the same fed with sheep and cattle, wheat, oats, vetches, or peas. In the rich heavy lands the rotation is fallow, wheat, beans; on good light loam, turnips, barley, grass mown, ditto fed, wheat.

The broad-cast mode of sowing is almost universal. The only crop which is dibbled or set is beans. Both winter and spring vetches are sown in considerable quantities for sheep food. Turnips are usually sown broad-cast, and hoed twice. They are fed off by sheep folded on them. In the rye-lands, which are peculiarly adapted to the growth of turnips, an early quick-growing sort is frequently sown in July, and taken off in time for sowing wheat after it.

Flax was formerly cultivated to some extent in the Vale, but the belief that it was a very scourging crop, and returned nothing to the land, has led to the general prohibition of it in leases. Potatoes are raised in the rich light loams in considerable quantities. In a county of which the greatest part of the subsoil is calcareous, sainfoin is a most valuable production; it grows in poor chalky soils and remains in vigour for many years. Teasels are raised for the use of the manufacturers of woollen cloth, but not to such an extent as they were once. Gloucestershire contains grass-lands and meadows equal for richness to any in the kingdom.

Gloucestershire is essentially a dairy country, and has been always renowned for its butter and cheese. The Gloucester breed of cows, although now eclipsed in public estimation by the improved short-horns and the Devon, has qualities which make them still to be favourites with many experienced dairymen. The produce of a good cow should average from $3\frac{1}{2}$ to $4\frac{1}{2}$ cwt. of cheese in the year, or from 12 to 18 quarts of milk per day. The sheep peculiar to this county are the Cotswold and the Ryeland breeds. The first are large in the carcass, and rather strong in the bone, and the wool is coarse. The Ryeland or Herefordshire sheep are bred in the Forest district; they are small in size, but larger than the common Forest sheep. There are not many horses bred in this county, although they are generally preferred to oxen for the purposes of husbandry. The chief supply comes from the northern counties.

There are fine orchards in different parts of the Vale and Forest districts, and some very good cider and perry are made in the county.

Divisions and Towns. — Gloucestershire is divided into 28 hundreds. It is in the diocese of Gloucester and Bristol. It is in the Oxford circuit. The assizes are held at Gloucester. For parliamentary purposes it is divided into East Gloucestershire and West Gloucestershire, each of which returns two members to parliament; besides which the boroughs of Gloucester, Cirencester, Stroud, and Tewkesbury return each two members, and the borough of Cheltenham returns one member: total, 13 members.

The following are the principal towns, with the population of each in 1841 :—

Berkeley, 16 miles S.S.W. from Gloucester, is situated on the north bank of the Little Avon, which falls into the Severn a mile and a half from the town. The river is navigable for small vessels at spring-tides. The town consists of four streets diverging from the market-place. The church is a large and handsome Gothic structure, in the pointed style, with a modern bell-tower at some distance from the church. Population of the town, 926. The entrance from the Severn into the Gloucester and Berkeley Canal is $2\frac{1}{2}$ miles from Berkeley. On the south-east side of the town is Berkeley Castle, where Edward II. was murdered in 1327. It is an irregular pile, consisting of a keep and other buildings, all in a perfect state of repair, surrounding a court about 140 yards in circumference. None of the buildings which surrounded the outer court remain, except the entrance-gateway. A portion of the ditch, now dry, yet exists on the north side of the castle.

Bisley is 9 miles S.E. from Gloucester. It is a market-town, but is very small. The church is ancient, and contains some interesting monuments. The parish, which is large, and contains several villages, has a population of 5339.

Bristol. [BRISTOL.]

Chipping Campden, 24 miles N.E. from Gloucester, is an ancient market-town. The church is a handsome Gothic structure, and contains some interesting brass effigies and other monuments of merchants who inhabited the place in the fourteenth century, when it was a great mart for wool. Population, 1521.

Chipping Sodbury, 24 miles S.S.W. from Gloucester, is an ancient market-town. It was formerly a great mart for cheese. The church is large, and has a lofty tower. Population of the parish, 1273.

Cheltenham, a parliamentary borough, is pleasantly situated 8 miles N.E. from Gloucester, in a valley which has the Cotswold Hills forming a vast amphitheatre on the S.E. and E. The town is modern, and owes its origin to a saline spring discovered there about 1716, which was afterwards inclosed; invalids began to resort to it in summer, and houses were built for their accommodation. Other springs were found, more houses were built, and in 1811 the population of the parish was 8323. In 1841 the population of the parish was 31,401. The borough is coincident with the parish, and returns one member to parliament. The town consists of a spacious street about a mile long, with other streets branching off from it. There are four churches, besides the parish church, and several places of worship for dissenters. The town contains a theatre, assembly-rooms, pump-rooms, and numerous hotels. There is a fine gravelled promenade called the Well Walk. The springs, of which there are about fourteen, are all saline, and contain chiefly chloride of sodium, or common salt, in solution, resembling sea-water, but some of the springs contain in addition a little iron, and there are other slight differences. There is a railway from Bristol to Cheltenham through Gloucester.

Cirencester, a parliamentary borough, 17 miles S.E. from Gloucester, is situated on the Churn, anciently the Corin, which joins the Thames at Cricklade. The place was a Roman station, and was called Corinium and Corin Castra. The Roman roads, called the Foss-Way, the Ermin Street, and the Icknield Way, met at Corinium. The walls, of which there are some slight remains, were two miles in circumference. Cirencester contained a magnificent abbey, built in 1117, and its mitred abbot had a seat in parliament. The present town is well built, paved, and lighted, and well supplied with water. The church is a fine gothic structure of the fifteenth century, and there are places of worship for several classes of dissenters, a grammar-school, a union workhouse, three endowed hospitals, and other charitable institutions. The borough is coincident with the parish, and returns two members to parliament. Population, 6014.

Coleford, 14½ miles W. by S. from Gloucester, is a small market-town consisting principally of one street. It is a chapelry in the parish of Newland. Population of the chapelry, 2208.

Dursley, 14 miles S.S.W. from Gloucester, is a small irregularly built town, consisting of two streets intersecting each other, and is situated at the base of a steep hill covered with a fine hanging wood of beech. Some of the houses are of considerable antiquity. The church is a large handsome building. Near the centre of the town is a neat market-house. The clothing business seems to have been carried on here for a very long time, and there are still some clothing-mills in the vicinity. Population of the parish, 2931.

Fairford, 23 miles E.S.E. from Gloucester, is situated on the banks of the Calne. The town consists of two streets neatly and regularly built. It has a free school, a lunatic asylum, and other charities. Fairford is celebrated for the beauty of its church, which was built in the reign of Henry VII. It has 28 windows of painted glass, with four or more compartments in each; but in several of them the figures are now mutilated or displaced. They are said to have been designed by Albert Dürer. Population of the parish, 1672.

Gloucester. [GLOUCESTER.]

Lechlade, 27 miles E.S.E. from Gloucester, is situated near the point where Gloucestershire, Wiltshire, Oxfordshire, and Berkshire have their junction, and near a small affluent of the Thames called the Lech. Here commences the Thames and Severn Canal, and the Thames first becomes navigable for barges of 70 or 80 tons' burden. In consequence of these favourable circumstances, the place has much traffic in the produce of the country and in London goods. The church is a handsome building in the pointed style: the pulpit is of sculptured stone. Population of the parish, 1300.

Marshfield is a small market-town 28 miles S. from Gloucester. The town consists chiefly of one street of old buildings, nearly a mile long. A considerable quantity of malt is made here for the supply of the Bath and Bristol brewers. There is a good charity school. Population of the parish, 1674.

Minchinhampton, 12 miles S.S.E. from Gloucester, a market-town, pleasantly situated on a gentle declivity, consists of four streets, lying at right angles to each other. The church, founded about the reign of Henry III., is large, with a central tower, and contains several interesting monuments. Population of the parish, 2243.

Mitcheldean, a small market-town, situated in a deep dell in the Forest of Dean, 10 miles W. from Gloucester, has a church of some antiquity, with a roof of oak timber finely carved. Population of the parish, 665.

Newent, 8 miles N.W. from Gloucester, is a small irregularly built market-town, situated in the Forest of Dean. It was formerly of more consequence than at present. The church is an ancient building of various architecture. The Hereford and Gloucester Canal passes by this town. Population of the town, 1454.

Newnham, 9½ miles S.W. from Gloucester, stands on an eminence rising from the western banks of the Severn, which is here nearly a mile across at high water. Newnham is of great antiquity. The houses are principally ranged in one long street, and the church stands on a cliff near the river. There is a quay for vessels of 150 tons' burden, and some trade is carried on with Bristol, London, and other places. Population of the parish, 1105.

Northleach, 16½ miles E. by S. from Gloucester, is a small market-town, lying in a bottom among the Cotswold Hills, near the source of the Lech. The church is a large handsome building. The market-house is an old building supported on columns. Some centuries back Northleach was important as a clothing town, but, not having sufficient supply of water to answer the demands of an increasing manufacture, the manufacture was gradually removed to more favourable situations. Population of the town, 939.

Painswick, 5½ miles S.S.E. from Gloucester, is a small town on the southern acclivity of Sponebed Hill. The church is an ancient building, with a tower and spire. Population of the town, 1510.

Stow-on-the-Wold, a market-town 23 miles E.N.E. from Gloucester, is situated on the summit of a high bleak hill. The houses, which are built of stone, are in general low. The church is a substantial building erected during the 14th and 15th centuries. Owing to the great elevation of the town, the inhabitants have a very inadequate supply of water. Population of the town, 1465.

Stroud, a parliamentary borough, 9½ miles S. from Gloucester, stands in a valley at the junction of two of the streams which form the Stroudwater. The borough of Stroud comprehends an important part of the west of England clothing district. The peculiar features of this district are, the situation of the mills on streams in deep ravines, the scattered and irregular manner in which the houses are built on the hill sides, and the contrast between the high land, in many cases with few inhabitants, and the valleys, studded with houses and thickly peopled. This district comprehends the market-towns of Stroud, Minchinhampton, Painswick, and several other places.

The site of Stroud was early chosen by clothiers and dyers, and the town has been improving of late years. The parish church is a large building, of various dates, with a tower and spire at the west end. A new church has been erected, and there are places of worship for several bodies of dissenters. The Stroud Canal, or Stroudwater Navigation, passes through the borough, and a branch railway passes through Stroud from the Great Western Railway to the Bristol and Birmingham Railway. Population of the parish of Stroud, 8680; of the parliamentary borough, which returns two members, 37,668.

Tetbury, an ancient market-town, is situated 20 miles S.E. from Gloucester, and consists chiefly of one long street, intersected by two shorter ones, with a spacious market-place, and a market-house in the centre. The ancient church was rebuilt in 1784, except the tower, on which a new spire was erected. Population of the parish, 2982.

Tewkesbury, a municipal borough and parliamentary borough, 9 miles N. by E. from Gloucester, is situated on the eastern bank of the Upper Avon, near its junction with the Severn. The small rivers Carron and Swilgate, tributaries of the Avon, flow through the parish. Within half a mile from the town a handsome iron bridge of one arch, 172 feet span, crosses the Severn. There is an ancient stone bridge of several arches over the Avon, and there are stone bridges over the Carron and Swilgate. Tewkesbury is a very ancient town. A great battle was fought near it, May 14, 1471, in which Queen Margaret and her son were taken prisoners. The town consists chiefly of three good streets, with several smaller ones branching from them. The parish church is of Norman architecture, and belonged to a Benedictine monastery which was suppressed by Henry VIII. The chief manufacture of the place is of cotton and lambs'-wool hosiery. There is a town-hall, with a hall for the corporation and an assembly-room in the upper part, and rooms for the borough courts in the lower part. The market-house is a handsome building, with a pediment supported by Doric columns. The municipal borough is governed by 4 aldermen and 18 councillors. Population, 5862. The parliamentary borough, which returns 2 members, is coincident with the municipal borough. There is a short branch railway to Tewkesbury from the Bristol and Birmingham Railway.

Thornbury, a market-town, is situated 21 miles S.S.W. from Gloucester. The buildings are in general old. The church is a large handsome structure, surmounted by a lofty tower ornamented with rich open-worked battlements and eight pinnacles. The town has two free-schools and several charities. Population of the town, 1862.

Wickwar, 20 miles S. by W. from Gloucester, is an ancient market-town. It is well watered by two small streams which run through the town, over one of which there is a handsome stone bridge. The church is large, and has a lofty tower. There is a well-endowed free-school. Population of the parish, 1125.

Winchcomb, a market-town 14 miles N.E. from Gloucester, is beautifully situated at the base of several hills, having the little river Isbourne, an affluent of the Upper Avon, flowing through it. This place is of great antiquity, and was once of importance, having been anciently the site of a castle and of a mitred abbey sufficiently large for the accommodation of 300 Benedictine monks. Every trace of these buildings has been long destroyed. The town consists chiefly of two streets intersecting each other; the houses are mostly low and are built of stone. The church is a fine Gothic building, with an embattled tower at the west end. There is an endowed grammar-school. Population of the parish, including several hamlets, 2613.

Wotton-under-Edge, 18 miles S. by W. from Gloucester, is an old town, situated near the base of a ridge of wooded hills, whence it derives its name. The old town was burnt down in the reign of King John. The present town is well built, and contains a handsome old church, in which there are many curious monuments. There is a well-endowed free-school, and three hospitals, with other charities. Wotton is one of the clothing towns, and has several clothing-mills. The Little Avon, which falls into the Severn near Berkeley, runs by this town. Population of the town, 1393.

History and Antiquities. — On the division of the island into Britannia Prima and Britannia Secunda, after the conquest by the Romans, in A.D. 45, that part of Gloucestershire which lies S.E. of the Severn was included in the Britannia Prima; the other part in Britannia Secunda. After the subsequent division made under Constantine, the county, or the greater part of it, was included in the province named Flavia Cæsariensis. From the ruins which have been at different times discovered in various parts of the county, it was evidently much occupied by the Romans. Cirencester was the great metropolis, while Gloucester and the hills about the Severn were the great military positions. Gloucestershire formed part of the Mercian kingdom under the Saxon dynasty, and was much harassed by the Danes. After the Norman conquest, the county was disturbed by the contest between Stephen and Queen Maude, then by the wars between Henry II. and the Welsh, then by the disputes between John and the Barons, and afterwards by the wars of the Roses. In the civil wars of a later period, between the parliament and the crown, many contests took place in different parts of Gloucestershire.

The principal Roman roads in the county are the Foss Way, Ermine Street, Iknield Street, and the Via Julia. There are several traces of Roman camps in this county, in which coins and other antiquities have been found. Near Sydney Park are the remains of a Roman bath, of an elliptic form, about three yards in length. Various foundations of Roman buildings and other antiquities have also been found near Cirencester. But Woodchester, a small village about two miles and a half south-west of Stroud, is the most celebrated place in this county for the number and beauty of the Roman antiquities found there. A great tesselated pavement was discovered in the digging of graves in the churchyard of this village; it appears to have been a square of 48 feet 10 inches

with a very rich design. Various foundations of apartments with tesselated pavements of various patterns have been found at different periods within the churchyard and contiguous to the great pavement. There are many traces of British, Saxon, and Danish works in this county, as well as of Roman. At Beachley, a point of land at the mouth of the Wye, extensive earth-works are still remaining, probably of British origin. Offa's dyke terminates here, and may be clearly traced crossing the road at Buttington Tump. Camps, tumuli, and other remains of antiquity are numerous.

There are several fine old family seats in this county, some of which are of very ancient date; and there are also ruins of castles and abbeys. Among the most distinguished of these are Sudely Castle, built in the reign of Henry VI., and now in ruins; Badminton House, built in 1682; Barnsley House, a structure in the Italian style; Barrington Hall, built in 1734; Blaize Castle, near Bristol; Highnam Court, built during the Protectorate; Oakley Grove, built early in the last century; and Southam House, a venerable mansion, built in the time of Henry VIII., and retaining more of its original form than perhaps any other domestic building in England of that æra.

(Fosbrooke's *History of Gloucestershire;* Rudge's *Tour;* Lysons' *Gloucestershire; Beauties of England and Wales;* Conybeare and Philips's *Outlines of the Geology of England.*)

GLOVE (from the Anglo-Saxon, *glof*), a cover for the hand. The etymology of the English word shows an early use of gloves in this country. In the middle ages thay formed a rich and costly article of the dress of important personages.

The great seats of the leather glove manufacture in England at present are—Worcester, Woodstock, Yeovil, Leominster, Ludlow, and London. The number made every year in the town and immediate neighbourhood of Worcester has been estimated to exceed 6,000,000 pairs. Worsted gloves are made chiefly in and near Leicester, cotton gloves in Nottingham, and silk gloves in Derby. The manufacture of these three kinds is closely connected with that of stockings. In the three years, 1845-6-7, there were 6,618,220 pairs of French gloves imported into this country, in addition to the home manufacture.

GLOVER, RICHARD, was born in London in 1712. His father was a merchant, who gave him a common school education. At an early age he commenced his 'Leonidas,' an epic poem on the Persian War, which he published in 1737, in nine books, and subsequently extended to twelve books in 1770. Political feeling raised the work into undue temporary success, but from which it has perhaps since suffered. A sort of continuation of 'Leonidas,' called the 'Atheniad,' was published posthumously, in 3 vols. 12mo, in 1787. In 1760 Glover, who took an active part in politics, and in opposition to Walpole, became M.P. for Weymouth, and distinguished himself as a good speaker and a valuable man of business. He died in November 1785.

GLOW-WORM. [LAMPYRIDÆ.]

GLUCINIUM, the metallic base of an earth or oxide (*Glucina*) discovered by Vauquelin in 1798. It is a fine powder of a deep gray colour, very difficult of fusion. When burnished, it acquires the metallic lustre. It suffers no change by exposure to air or water at common temperatures; but when heated to redness it burns, combines with oxygen, and is converted into glucina. Its atomic number is 26.54. *Glucina*, the only known oxide of the metal, is a light white powder, inodorous, tasteless, infusible, insoluble in water; its specific gravity is about 3. Its composition is $G^1 O^1$. *Chloride of Glucinium* is colourless, sweet, very fusible and volatile, and sublimes readily in white brilliant needles; it deliquesces in the air. It consists of $G^1 Ch^1$. Glucinium combines also with bromine, iodine, and sulphur. The salts which glucina forms with acids are not important. They are all colourless, except the chromate, which is yellow; the taste is sweet, and hence the name of the earth, and slightly astringent.

GLUCK, JOHANN CHRISTOPH VON, was born at Neustadt-an-der-Waldnab, in Bavaria, March 25, 1700. When very young he lost his father, and was totally neglected; but, self-taught, he contrived by his talents to work his way to Vienna, and thence to Italy, where he studied under Padre Martini. Lord Middleton brought him, in 1745, to England, where he remained a few years without attracting much notice. He then returned to Italy, where he formed an intimacy with Calzabigi, the poet, and the two concerted a reform of the Italian opera, which was carried out in the instances of 'Orpheus' and 'Alceste,' both of which were produced at Vienna, the former in 1764, the latter in 1769. Such was now his reputation, that he was invited to compose an opera for the French Académie Royale. For this he wrote his 'Iphigénie en Aulide,' which was brought out at Paris, under his own direction, in 1776, and completely triumphed over the national prejudices opposed to it. Shortly afterwards however a violent and long-continued hostility ensued between two parties at Paris, one of whom espoused the cause of Gluck, and the other that of the Italian composer Piccini.

Besides the above-mentioned operas, Gluck produced several others, the best of which are 'Armida,' 'Iphigenia in Tauris,' and 'Echo und Narcissus.' He returned to Vienna in 1784, and shortly after was attacked by paralysis, which terminated his life Nov. 17, 1787. This truly great composer possessed a powerful and original mind, which has placed him in the very highest rank of musicians.

GLÜCKSTADT. [HOLSTEIN.]

GLUE, a substance employed to effect the adhesion of different portions of wood. It is prepared from the clippings of hides, hoofs, &c., by washing in lime-water, boiling in water, skimming, straining, evaporating, cooling, and drying. When properly prepared, glue is of a deep brown colour, translucent, and free from spots and clouds. When required for use, it is broken into pieces, and steeped for about 24 hours in cold water, by which it swells and softens;

after this it is heated in a glue-pot, which is a water-bath made for the purpose.

Another variety of glue, which is much softer and called *size*, is obtained from parchment cuttings and several animal membranes.

GLUMACEOUS PLANTS are what are more commonly called *Graminaceæ* and *Cyperaceæ*, to which *Juncaceæ* and a few other orders are occasionally added.

GLUTEN. [Food.]

GLUTTON. [Gulo.]

GLYCE'RIA, a genus of plants belonging to the natural order of Grasses, and the tribe *Festucineæ*. The species are handsome grasses with long stems, and mostly inhabit watery places. There are two species found in Great Britain, *G. aquatica* and *G. fluitans*. They contain a large quantity of saccharine matter, but are coarse grasses.

GLYCERIN is a nearly colourless viscid liquid, obtained from olive oil; it cannot be made to crystallize. Its taste is extremely sweet. It mixes with water in all proportions, and is not fermentable. It consists of C^6 H^8 O^6.

GLYCYRHI'ZA is a genus of pea-flowered Exogens, consisting of herbaceous plants.

One of the species, *Glycyrhiza glabra*, a plant growing wild all over the south of Europe from Spain to the Crimea, produces the common liquorice roots of the shops, from which the well-known black extract of the same name is obtained. It is a native of Germany, but cultivated extensively in some parts of Britain, especially about Pontefract, in Yorkshire, whence the name of Pomfret cakes, applied to a fine preparation of liquorice. Though commonly grown in the field, it requires very superior culture in order to produce fine roots for sale in the market. It thrives best in a rich black mould, and must be plentifully supplied with manure. Plants are either raised from seeds, or, as is more commonly the case, from a division of the old roots, which are cut into pieces 8 or 10 inches long. Choice should be made of those which, as planters term it, have good eyes, that is, buds, and which are more likely to push and grow strong. After three or four years' growth, the main roots will be of a mature size, and fit for consumption or the market. It is an excellent plan to cover the crowns of the plants in winter with good rotten dung, as it not only preserves them from severe frosts, but is washed down by the rain, and becomes valuable nourishment to the roots.

Other species of this genus yield a sweet substance from their roots.

The extract from the roots of *Glycyrhiza glabra* is chiefly prepared in Spain, and is imported under the name of Spanish Liquorice. The rhizoma is generally allowed to attain the age of three years, and is then taken up. It is often several feet in length, and about half an inch thick. The odour is faint, the taste sweet but mawkish; and, if the bark be chewed, it is at last rather acrid, which is owing to the presence of a soft resin. Infused in warm or macerated in cold water, it affords a mucilaginous fluid, which is bland and demulcent. The powder is much used to involve recently made pills, in order to prevent them from adhering to each other. The extract is formed into rolls from six to eight inches long, which are dried, and surrounded with bay leaves, to prevent them from adhering. Good liquorice juice is black, dry, easily broken (in cold weather), with a shining fracture. It should dissolve easily and entirely in the mouth, when pure; but crude liquorice has generally more or less copper, derived from the pans in which it has been boiled: it is therefore subjected to a process of purification, and is then termed refined liquorice.

GLY'PHIS, a genus of fossil placoid fishes, from the London clay. (Agassiz.)

GLYPTOCE'PHALUS, a genus of fossil cycloid fishes, from the London clay. (Agassiz.)

GLYPTO'STEUS, a genus of fossil ganoid fishes, from the old red sandstone of Elgin and Clashbennie (Agassiz): two British species.

GMELIN, JOHANN GEORG, born at Tübingen in 1709, applied himself to the study of natural history and chemistry, in which he became distinguished. On going to St. Petersburg he was made a member of the Academy of Sciences of that capital. In 1733 he was sent by the Empress Anna to explore Siberia, in company with G. F. Müller and other men of science. This very laborious and interesting expedition lasted nearly ten years. Gmelin examined those vast and dreary regions as far as the banks of the Lena. His object was to proceed to Kamtchatka, but the state of his health and other difficulties made him retrace his steps to St. Petersburg, where he published his 'Flora Sibirica,' 4 vols. 4to., 1747. Having returned to his native country, he was made professor of botany and chemistry at Tübingen, where he died in 1755. His 'Travels' ('Reisen durch Sibirien') were published at Göttingen in 1751. Gmelin was one of the first explorers of the northern part of Asia. A genus of Asiatic plants was named Gmelina by Linnæus, in honour of J. G. Gmelin.

GMELIN, SAMUEL GOTTLIEB, nephew of the preceding, was born at Tübingen in 1744, studied in that university, where he applied himself chiefly to the natural sciences, and took his degree of M.D. In 1767 he went to St. Petersburg, and in the following year he was sent by the Empress Catherine on a scientific tour through the southern provinces of Russia, during which he died in 1774. The Empress Catherine provided for his widow. His Travels ('Reisen durch Russland') were published at St. Petersburg. The last volume contains a biographical notice of the author. Gmelin wrote also 'Historia Fucorum,' and made other contributions to natural history.

GMELIN, JOHANN FRIEDRICH, was born at Tübingen in 1746, where he studied, and took a doctor's degree in 1769. He early devoted himself to the study of natural history, and, after finishing his education, and travelling through Holland and England, he returned to Tübingen, where he principally occupied himself with giving lectures on natural history and botany. He here acquired sufficient reputation to be admitted among the members of l'Académie des Curieux de la Nature; and in 1775 he was appointed pro-

fessor extraordinary of medicine at Tübingen. He afterwards got the same appointment at Göttingen, which he held till his death, in 1804. During the thirty years of his academical career he published numerous works, which show the extent and variety of his knowledge and learning, but do not say much for his talents or judgment. His most important works are his historical compilations or dictionaries; but he is best known as the editor of the thirteenth and last edition of the 'Systema Naturæ' of Linnæus, which was first published at Leipzig, in 9 parts, 8vo., between the years 1788 and 1793. Gmelin wrote numerous works and papers on botany and chemistry. A list of his writings is given in the 'Biographie Universelle,' and in the 'Biographie Médicale' of the 'Dictionnaire des Sciences Médicales.'

GMELI'NA, an Asiatic genus of plants, of which only one species was formerly known, but five are described by Dr. Roxburgh, and a sixth noticed by Dr. Wallich in his 'Indian Catalogue.' All the species of Gmelina form shrubs or trees, of which the latter are valued for their timber. They are found in the islands of the Indian Ocean, extending thence into the Malayan and Indian peninsulas. The leaves of *G. parvifolia* are remarkable for rendering water very mucilaginous; but *G. arborea* appears to be the most valuable for its timber, as, besides being spread over a wide extent of territory, it attains a great size. The wood resembles teak, the colour being the same, the grain rather closer, but it is somewhat lighter. It seems particularly valuable for situations where it is exposed to both the influence of air and of water, and has resisted the influence of both when tried by way of experiment longer then any other wood.

GNAPHA'LIUM, a genus of plants belonging to the natural order Compositæ. The species of this genus have a soft pubescent foliage with dry flowers, which keep for a long time without perishing, and, like those of some species of Helichrysum and Xeranthemum, are called 'everlastings' or 'immortal flowers.' The species are numerous. Five are British. Of these *G. siliquosum* is the most common, growing in wet and sandy places. *G. luteo-album*, *G. sylvaticum*, *G. supinum*, and *G. pusillum* are all rare plants. Several of the species of the old genus Gnaphalium are referred to new genera as Antennaria and Filago. *G. dioicum* is *Antennaria dioica* of Gærtner. It grows on mountain heaths in Great Britain, and is commonly called Cotton-Weed, and by the older herbalists *pes cati*. Its flowers are astringent, and were formerly employed in the cure of hooping-cough, phthisis, and hæmoptysis. *G. arenarium* (*Helichrysum arenarium*) has been employed as a remedy in dyspnœa.

GNAT. [CULICIDES.]

GNA'THODON, a genus of conchifers with the ligament inclosed in the cartilage pit, established by Mr. Gray, who exhibited (October 1836) this peculiarity of structure in the part in some mactraceous shells, at a meeting of the Zoological Society of London, observing that it was also found in a new genus that he had named at the British Museum *Mulinia*, of which he had described five species; he also stated the necessity for forming a new genus, of which *Mactra Spengleri* may be regarded as the type. ('Zool. Proc.,' 1836.)

GNATHO'STOMA (*γνάθος*, a jaw, and *στόμα*, the mouth), a genus of nematoid Entozoa, discovered by Mr. Owen in the stomach of the tiger. These worms, the largest of which are about an inch in length and a line in diameter, were found in the substance of several small cellular tumours, situated immediately beneath the mucous membrane of the stomach, and apparently formed by the condensation and thickening of the submucous cellular tissue, which was probably owing to the irritation of the Entozoa. Only a pair of these animals were found in each tumour, and they always consisted of male and female, the former of which was about one-fourth smaller than the latter.

Mr. Owen has since found the Gnathostoma in the stomach of other animals of the cat kind, as the leopard.

Beautiful preparations of both the male and female worms dissected are preserved in the museum of the College of Surgeons in London (Zoological Series, Gallery).

GNEISS, a German term for the lowest series of stratified primary rocks. There are no organic remains in the gneiss strata. Gneiss is a compound of the same three minerals as granite, viz. quartz, felspar, and mica. In the same manner as granite varies in the proportion of its ingredients, the magnitude of the component crystals, the absence of mica, or the substitution of other minerals for it, so gneiss exhibits corresponding variations. The varieties are extremely numerous; but all of them are stratified, the beds varying much in thickness, and being most remarkably subject to contortions both on a large and small scale, especially where granite veins cross the laminæ. For the relative position of Gneiss, see GEOLOGY.

GNETA'CEÆ, a natural order of plants belonging to the small class of Gymnosperms. The species of this family are natives of the temperate parts of Europe, Asia, and South America. *Gnetum* is an inhabitant of the hottest parts of India and Guiana. Some of the species of Gnetum are used as food. The seeds of *G. gnetum* are eaten in Amboyna, and are roasted, boiled, or fried. The green leaves are cooked and eaten like spinach. The inside of the fruit of *G. urens* is lined with stinging hairs; the seeds are, however, eaten: the stem exudes a transparent gum, and when cut across yields a large quantity of transparent water, which is used for drinking.

GNOMIC POETS OF GREECE are those moral and philosophical poets whose remains consist chiefly of short sententious precepts or reflections. Such are the Gnomæ of Theognis, which, though numbered consecutively as a connected poem to 1200 lines, form in fact a collection of unconnected members, varying from two to thirty lines in length. This notion of a pithy saying, or apophthegm, is one of the meanings of *γνώμη* (gnóme), whence comes the adjective *γνωμικός* (gnomikos), relating to gnóme. These poets have

been edited by Brunck ('Gnomici Poetæ Græci,' Argent., 1784, 4to.). The principal authors contained in this edition are Theognis, Tyrtæus, Solon, Simonides, with many others, some to the extent only of a few lines. Brunck's edition contains also a collection of Gnomæ from the comic writers. The Gnomic writers are sometimes classed under the general name of Elegiac Poets. There are some remarks on *Gnomæ*, and Solon and Theognis, in Müller's 'History of Greek Literature,' p. 119, &c.

GNO'MON (the Greek γνώμων), or style of a dial, is the plate which projects from the surface of the dial-plate, the edge of its shade determining the hour-line.

GNOMONIC PROJECTION. The gnomonic projection of any portion of a sphere is that which is constructed on the supposition that the eye is in the centre of the sphere. The consequence is, that any great circle whatsoever of the sphere is projected into a straight line, which property can belong to no other projection. The maps of the earth and of the stars published by the Society for the Diffusion of Useful Knowledge are drawn in this manner, a full account of which may be found in the 'Explanation of the Maps of the Stars,' London, 1836. The gnomonic projection derives its name from the connection between the methods of describing it and those for the construction of a gnomon or dial.

GNOSTICS, derived from the Greek word *gnosis* (γνώσις), 'knowledge,' was employed by the fathers of the first two centuries to designate all individuals who professed to interpret the Scriptures by the aid of philosophy. It is supposed from various passages in the New Testament (Col. ii. 8; 1 Tim. i. 4; vi. 20; 2 Tim. ii. 16, 17; Titus iii. 9; 1 John, ii. 18) that the doctrines of the Gnostics were taught in the times of the Apostles; and the Nicolaitans, who are condemned by St. John (Rev. ii. 6, 15), are looked upon by the fathers as forming a sect of the Gnostics. Many of the fathers consider Simon Magus, Dositheus, and Menander, to be the first individuals who propagated Gnostic opinions; but they are more correctly classed by others among the opponents of Christianity. The principal teachers of Gnosticism were Cerinthus and Carpocrates.

Gnosticism included many sects that differed considerably from each other; and it is difficult to give an account of their opinions that will apply equally to all the sects.

(Mosheim, *Ecclesiastical History;* Lardner's *History of Heretics.*)

GNU. [Antelope.]

GOA. [Hindustan.]

GOAT, the English name for the well-known horned ruminant Αἴξ (generally used for the female), τράγος, χίμαρος (the male), of the Greeks; *Caper*, and *Hircus* (male), *Capra* (female), *Hœdus* or *Hœdus* (a young male kid), *Capella* (female kid), of the Romans; *Becco* (male), *Capra* (female), *Capretto*, and *Caprettino* (kid and kidling), of the modern Italians; *Bouc* (male), *Chèvre* (female), *Chevreau* (kid), of the French; *Cabron* (male), *Cabra* (female), *Cabrito* (kid), of the Spanish; *Bock* (male), *Geiss* (female), *Bocklein* (kid), of the Germans.

The goat affords another example of the uncertainty which clouds the history of our domestic animals; and to this day zoologists are not entirely agreed as to the species from which it is derived. One of the latest writers on the subject, who is well known for his industry, as well as his acuteness and accuracy, writes thus (1837):—'The opinions of naturalists have been much divided respecting the original stock of our domestic goat; some referring it to the *Ægagrus*, and others to the *Ibex*. Buffon appears to have adopted the latter opinion; but most modern zoologists who have paid much attention to the question, and who have brought to the consideration of it all the helps which recent discoveries in philosophical zoology have furnished, have leaned to the belief that the *Ægagrus*, or wild goat of the mountains of Caucasus and of Persia, is the true original stock. The zoological characters of this animal certainly bear a closer resemblance to those of the domestic breeds; and it is worthy of remark, that the horns of the Persian domestic goat, though smaller, are similar in form to those of the *Paseng*, or *Ægagrus*. The arguments which have been urged from the intermixture of the *Ibex* with the common goat are at present of little value, as the facts recorded are very deficient. The large goats which are reported to have been brought from the Alps and the Pyrenees to the Garden of Plants in Paris, and which were stated to have been wild, were probably the progeny of the *Ibex* with the common goat, as there is no proof of the existence of the true *Ægagrus* in Europe. These were found to be capable of producing offspring, and the details are given by M. Fred. Cuvier with great clearness: but the old fault still remains; the question is not set at rest by these observations; for we are only informed that they produce offspring, without any statement whether they will breed *inter se*, or only with the common goat. The progeny however were either prematurely brought forth, or lived only a short time in a sick or languishing condition. Surrounded by these doubts, and without the power of satisfactorily solving

Ibex (*Capra Ibex*).

them, it is better perhaps to leave the question to be decided by future experiments, should the opportunity ever occur of determining the results of interbreeding between the *Ibex*, the *Ægagrus*, and the common Goat, particularly with reference to the *mutual* fertility of the offspring.' (See 'Bell's British Quadrupeds.')

'No animal,' says Pennant, 'seems so subject to varieties (the dog excepted) as the Goat;' nor did its multitudinous transfigurations escape Pliny (lib. viii. c. 53). Cuvier observes that the domestic goat, *Capra Hircus*, varies infinitely in stature, colour, length, and fineness of the hair, and in the size and even in the number of the horns. The goats of Angora, in Cappadocia, with their soft and silky hair, and those of Tibet, the delicate wool of which grows among the long hair, and is manufactured into the shawls (cachemires) so highly prized, are especially alluded to by him. The Angora goat, which inhabits the tract that surrounds Angora and Beibazar, in Asiatic Turkey, where the goatherds bestow much care on their flocks, frequently combing and washing them, loses, it appears, the delicacy of its hairy covering when exposed to a change of climate and pasture; and Pennant hints his suspicions that the design of the Baron Alstroemer, a patriotic Swede, who imported some into his own country to propagate the breed for the sake of their hair, turned out fruitless. A spirited attempt to acclimatise the Cashmere goat was made by an English

Tibet Goat, or Cashmere Goat.

gentleman, Mr. Towers, some years ago. The Cashmere goats, which lived some time in the gardens of the Zoological Society, and at the farm on Kingston Hill, certainly did not appear to have suffered in the fineness of their coats; but it is one thing to keep an imported individual by care and attention in the same state, and another to carry on the breed from generation to generation in its pristine beauty, under a different sky and on a strange pasture. We have indeed been informed that the flock of Mr. Towers amounted to about forty, and that the shawls made from the produce of their hides were excellent. One of these shawls was presented to Queen Adelaide. The importance of this manufacture to the people of Cashmere may be estimated from the alleged fact that sixteen thousand looms are there in constant work, each loom giving employment to three men, the annual

sale being calculated at thirty thousand shawls. A preference is given to the wool of Tibet, and twenty-four pounds' weight of the best of it is said to sell at Cashmere for twenty rupees. The wool is spun by women and coloured afterwards. It appears also, from a book quoted in the 'Naturalist's Library' ('Ruminantia,' part 2, by Sir Wm. Jardine), that a fine shawl, with a pattern all over it, takes nearly a year in making. The persons employed sit on a bench at the frame; sometimes four people at each, but if the shawl is a plain one only two. The borders are marked with wooden needles, there being a separate needle for each colour, and the rough part of the shawl is uppermost while it is in progress of manufacture. A Tartar half-breed, having been found to thrive well in a colder climate, has been introduced into France, not without success. The Cashmeres however which are brought from the kingdom of that name are the shawls in high request, and those who are curious in such articles should remember that there are in India several other goats, besides the true Cashmere breed, whose wool is employed for the same purpose.

The *Syrian Goat*, with its excessively long ears, which is plentiful in the East, and, according to Pennant, supplies Aleppo with milk, is worthy of especial notice, as well as the *Dwarf African*, with its two hairy wattles under the chin, and the pretty little *Whidaw Goat*. Lieutenant-Colonel Sykes, in his Catalogue of the Mammalia obtained by him in the Deccan, notices *Capra Hircus*, Linn. The goats in the Deccan are gaunt, stand high on their legs, have the sides much compressed, and are covered with long shaggy hair, which in most is black. Ears nearly pendent. Irides ochry yellow or reddish yellow. Tail always carried erect in movement.

That the goat and sheep will interbreed is a fact sufficiently attested. M. F. Cuvier states, that the mule which is the result of the connection participates in the nature of its parents, and is fruitful, but reproduces with difficulty. 'I have had,' says this zoologist, 'a similar female mule, which in its form inclined to the sheep, while it leant to the she-goat in its gait and in its hair; it did not couple till the third year with a goat, and was fruitful.' Upon this Mr. Bell remarks, that there is the same deficiency in the experiment as that which rendered the intermixture of the Ibex with the common goat before alluded to by him unsatisfactory.

During a visit to Rhenish Germany, in the autumn of 1837, Mr. Ogilby, whose attention has been particularly directed to the Ruminantia, learned from Professor Cretzschmar, the well-known editor of the mammalogical part of Dr. Rüppell's first 'Atlas,' the success of an experiment which the professor had been carrying on for some years in the neighbourhood of Frankfort on the Main, to ascertain the possibility of procuring a cross between the Cashmere goat and the Saxon Merino sheep. With this intention Professor Cretzschmar had, two or three years previously, procured a Cashmere buck, which was put into a stable with twelve Merino ewes. For two seasons however his hopes were disappointed, and it was not till the season

of 1836 that the desired union took place. During the spring of that year, the sheep very freely took the buck, and produced fine healthy lambs, which were, when Mr. Ogilby obtained his information, rather better than a year old: an examination of these Professor Cretzschmar undertook to procure for Mr. Ogilby, who went to Frankfort for that purpose. He there found that the animals in question had been bred on a farm about a mile from the city. They were kept in a large stable with a number of pure Merinos; and so closely did they resemble the pure Saxon breed, that it was impossible to perceive any difference in their external characters. The most minute characters of their female parents, the Merinos, were reproduced in these young animals; the spiral horns, long tails, and spurious lachrymal sinus, or pit under the eye, were exactly those of the sheep; the pile of the wool, and even that peculiar quality which manufacturers call the 'yolk,' were in all respects those of the Merinos; the pelt was without any intermixture of long hairs, nor could Mr. Ogilby by the most minute examination discover the remotest approximation to any other character of the male parent.

Without dwelling on the utility of the domestic goat to man, a utility less palpable in our island than on the continent generally, where its wool, its milk, and its flesh are in esteem, we must pause for a moment to say a few words as to the characters of the genus *Capra*, compared with those of the genus *Ovis*. We shall, however, be the more brief, because we may here refer to the 'Farmer's Library,' article 'Sheep,' vol. ii. p. 17, in which the subject is fully discussed.

In the genus *Capra*, the male is bearded; there are no suborbital sinuses, no interdigital pits. The horns are keeled and turned upwards, the tail is short, and naked below. In combat it rears aloft, and lets the weight of its body fall on its adversary, but does not run a-tilt. Males odorous.

In the genus *Ovis* there are both suborbital sinuses and interdigital pits; the horns are not keeled, but massive and triangular (as to their section) and outwardly spiral. Males not truly odorous.

In both the goats and sheep the horns are persistent, consisting of a corneous envelope covering a cancellous bony core.

In both, the teats of the female are two in number, and in neither are there inguinal pores.

The species of wild goat (*Capra*) are numerous throughout the mountain chains of Europe, Asia, and North Africa. It must be observed, however, that neither the Ghôral of the Nilgherry Hills nor the Aoudad of North Africa, belong either to the genera *Ovis* or *Capra*.

Fossil remains of the genus *Capra* are found in the newer pliocene deposits of Great Britain. (Owen's 'Hist. of British Fossil Mamm.,' p. 489.

GOAT-MOTH. [Cossus.]

GOATSUCKERS. [Night-Jars.]

GOBELIN, GILLES and JEAN, brothers, who introduced from Venice into France, in the reign of Francis I., the art of dyeing scarlet, and established extensive workshops for the purpose upon the small river Bièvres, in the Faubourg St. Marcel of Paris, at Gentilly. Here the brook takes the name Gobelins from the manufactory. In the year 1677 Colbert purchased the dye-houses from the Gobelin family, in virtue of an edict of Louis XIV., styled it the Hôtel Royal des Gobelins, and established on the ground a great manufactory of tapestry, similar to that of Flanders. The celebrated painter Le Brun was appointed director-in-chief of the weaving and dyeing patterns. Under his administration were produced many magnificent pieces of tapestry, which have ever since been greatly admired.

GOBI, for which formerly the less correct expression *Cobi* was used, is a Mongolian term signifying 'desert,' and employed to indicate the immense tract of desert country which occupies nearly the middle of the high table-land of eastern Asia, and extends from the neighbourhood of Yarkand and Khotan, or from about 80° E. long. on the west, to the Kingkhan Oöla, or about 120° E. long. on the east. But a portion of this desert extends east of the Kingkhan Oöla to the northern boundary of the Chinese province of Leao-tong, more than five degrees farther east. The Gobi lies between 35° and 45° N. lat., on the west being nearer to 35°, and on the east nearer to 45°. Its mean width may be between 350 and 400 miles, and its length perhaps not less than 1800 miles.

The climate of the Gobi is extremely cold. The winter lasts more than nine months; and even in July and August snow falls, and it frequently freezes. The Eastern Gobi is occupied by different tribes of the Mongolian race, who have numerous herds of camels (but only the Bactrian), horses, and sheep: in the more mountainous districts there are also black cattle, but they are not numerous. In the Western Gobi are some nomadic tribes of the Turkish Tartar race.

GO'BIO, a genus of fishes belonging to the section *Malacopterygii Abdominales* and family *Cyprinidæ*. The species of this genus differ chiefly from the true Carps in having the anal and dorsal fins short and destitute of bony rays. The Common Gudgeon (*Gobio fluviatilis*, Ray) affords an example of this genus.

The Tenches (genus *Tinca*, Cuv.) may be here noticed, since they possess most of the characters observable in the Gudgeons; their scales however are very small, and so are their barbules or cirri. One species only is found in this country, the Common Tench (*Tinca vulgaris*, Cuv.).

In the genus Cirrhinus, which comes next in Cuvier's arrangement, the dorsal fin is larger in proportion than in the Gudgeons, and the cirri are situated on the middle of the upper lip.

GO'BIUS, a genus of acanthopterygious osseous fishes, belonging to the family *Gobioidæ*. All the species have two dorsal fins, scaly bodies, and a disk beneath the throat formed by the united ventral fins. By means of this disk they have the power of attaching themselves to rocks. Several species of Goby are met with on the British coast. The largest is the *Gobius niger* of Linnæus, which attains the length of six inches, and ranges from Cornwall to the Orkneys. Mr. Couch has inquired into the habits of the Black Goby, and finds that

when it has seized its prey, it carries it off alive in its mouth to its resting-place, which is among rocks. The other British Gobies, *G. bipunctatus*, *G. minutus*, *G. gracilis*, and *G. unipunctatus*, are mostly inhabitants of sandy ground. On the shores of the Mediterranean Gobies abound, and are also found in deep water, even to a depth of fifty fathoms. The deep-water species are distinct from those frequenting the coast-line.

The species of *Gobius* are very tenacious of life, and are capable, like their neighbours, the Blennies, of living some time out of water. The most remarkable fact connected with the history of these fishes is their nidification. That the Goby built a nest was known to the ancient Greeks. This nest they construct in spring, of sea-weeds, &c. and in it the female deposits her eggs, whilst the male watches over them until they are hatched. The nest of the Goby is very well built, and has of late been observed on our own coasts. True Gobies occur in the seas of the southern hemispheres as well as in those of the northern.

GÖCKINGK. [GERMANY—*Language and Literature.*]

GODALMING. [SURREY.]

GODAVERY. [HINDUSTAN.]

GODEFROY. [GOTHOFREDUS.]

GODFREY OF BOUILLON. [BOUILLON.]

GODFREY, THOMAS, was born in the city of Philadelphia, where he carried on the business of a glazier. James Logan, who had some reputation as a mathematician, having treated him with kindness and lent him books, he presented to that gentleman in 1730 a paper describing an improvement of the quadrant. In 1732 Logan wrote a letter to Dr. Halley, in which he gave an account of Godfrey's invention, but no answer was returned. Meantime, in 1731, Mr. Hadley had communicated to the Royal Society of London a paper in which he described an improvement of the quadrant similar to that of Godfrey. The claims of both parties were afterwards investigated by the Royal Society, and it was decided that they were both entitled to the honour of the invention.

GODIVA, LADY. [COVENTRY.]

GODMANCHESTER. [HUNTINGDONSHIRE.]

GODOLPHIN, SIDNEY GODOLPHIN, EARL OF, was a younger brother of a family said to have been settled at Godolphin, in Cornwall, before the Norman conquest. His father was Francis Godolphin, who was made a Knight of the Bath at the coronation of Charles II., April 23, 1661. The date of his birth is unknown; but he is said to have been very young when first introduced in 1645 to Charles II., then Prince of Wales. On the Restoration he was appointed a groom of the bed-chamber. In the beginning of 1678, he was employed in the management of a correspondence between the Duke of York (afterwards James II.) and the Prince of Orange (afterwards William III.), on the subject of the union of England and Holland against France. This led to Godolphin's appointment, 26th March, 1679, as one of the lords of the treasury; and in September following, on the dismissal of the Duke of Monmouth and Lord Salisbury, he was, along with Lord Hyde (afterwards Earl of Rochester,) and the Earl of Sunderland, intrusted with the chief management of the national affairs. When Sunderland was dismissed in 1680, Godolphin continued in power, and shared in all those disgraceful secret negotiations between Charles II. and Louis XIV. for a renewal of the former dependent connection of Charles upon the French king. After acting for a short time in 1684 as one of the principal secretaries of state, he returned to the treasury, and was placed at its head, with the title of Baron Godolphin. During the reign of James he held only a subordinate position in the treasury, and acted as chamberlain to the queen. He is however said to have been one of the chief advisers of the king, who, when the Prince of Orange landed, sent Godolphin and two other noblemen to negotiate. On the establishment of the new government, Godolphin was continued as a lord of the treasury, and (with a temporary interregnum) so remained until May 1697, when he was replaced by Mr. Charles Montagu, afterwards Earl of Halifax. In 1700 Godolphin again entered office with a strong detachment of his—the Tory—party, through the medium of the Earl of Rochester; he went out with them a year or so after, and then joined a pure Tory administration (the first after the Revolution), on the accession of Queen Anne, March 1702. On the 8th of May, Godolphin became lord-high-treasurer. He was now aided by his connection with the Earl, afterwards Duke of Marlborough, whose daughter and successor in the dukedom afterwards married Godolphin's son and heir. On the 29th of December, 1706, Godolphin was created Viscount Railton and Earl of Godolphin, having been previously in 1704 made a knight of the garter. Gradually both Marlborough and Godolphin leaned towards the Whig party, and the latter openly joined it from about 1706. Mrs. Masham and Harley were now supplanting the Duke and Duchess of Marlborough in the queen's favour; and, although Harley was for a time overpowered and dismissed, he took such advantage of the excitement produced by the conduct of the ministry in the case of Sacheverel, in 1710, that the queen suddenly and rudely dismissed Godolphin on August 8, 1710. He died on the 15th of September, 1712, leaving one son, Francis, to inherit the title, which became extinct on his death, and, though revived for another relative, became again extinct. Godolphin's administration was made especially memorable by the victories of Marlborough and the Union with Scotland.

GODOONOFF, BORIS, tzar of Moscow, was born in 1552, of a noble family of Tartar descent. Having married the daughter of Maloota Skooratoff, a favourite of the tyrant of Moscow, Tzar Ivan Vassilevich the Terrible, he was attached to the court of the tzar at the age of 22, where, by his prudence, he obtained the favour of the tyrant, without aiding him in his cruelties. In 1580 the heir of the throne, Prince Fedor, married Godoonoff's sister Irene; which so increased his influence, that in 1582 he became one of the five members of the supreme council of state, and on Fedor's accession the whole power of government

was thrown into his hands. The highest possible titles were bestowed upon him, in addition to enormous estates. Fedor had no children; the heir to the throne was Demetrius, his brother, an infant of two years old, whose mother and her relations were Godoonoff's sworn enemies. He resolved upon the murder of the young prince, which was accomplished by assassins, at Uglich, where he resided, in 1591; but the people of the place rose and killed the murderers. Godoonoff caused a commission of inquiry to be issued, which declared the case one of suicide, and the presumed murderers innocent. Fedor, weak alike in mind and body, was satisfied; and the most horrible punishments were inflicted upon those who had killed the murderers. Two hundred were put to death, and a new town, Peleem, in Siberia, was peopled by the rest, who were transported thither. Uglich, a place of 30,000 inhabitants, became a deserted ruin. A daughter was born to Fedor in 1592, but she died the following year; and Fedor himself died in 1598; the last of the Ruric dynasty in the direct line. Irene was proclaimed sovereign, but, in a few days, she retired to a convent, and declared her unalterable resolution to take the veil. Her brother Godoonoff was then immediately hailed as sovereign by universal acclamation. He however refused the throne; and a general assembly of the states met on the 17th of February, 1598, and unanimously proclaimed Godoonoff tzar of Moscow. Still he resisted, and it was not till the hopes and fears of the people were raised to the highest pitch, and his sister, the tzarina, had blessed her brother as sovereign of Moscow, that he consented, saying, with humility, 'God's will be done,' and immediately entered upon a most vigorous and illustrious career. The Khan of Crimea, in place of attacking the country as he had intended, sued for peace. Siberia was finally subjugated. Notwithstanding several particular failures in his foreign policy, and in his attempts to ally his family by marriage to some powerful house, Godoonoff succeeded on the whole in establishing his country in an honourable position among nations. He maintained a close connection with England, and with Queen Elizabeth. To promote the civilisation of his country, he sent eighteen young men, of noble families, to England, Germany, and France, and in many other ways strove, and with success, to elevate his country. When the bad harvests of 1601 and 1602 produced a general famine, and threatened to utterly disorganise the country, Godoonoff became the real father of the nation. Bands of robbers infested the country, and their chief, Khlopko, was only put down by an army, in a regular battle, in which the commander of the tzar's force, was killed. In 1604 a rumour spread abroad that Prince Demetrius was alive and preparing in Poland to assert his rights. It is impossible to ascertain now whether or not this was an imposture. But the so-called prince levied an army, entered Russia, was joined by the forces sent to oppose him, and was in full march upon Moscow, when Godoonoff died suddenly, on the 13th of April, 1605, having, it is suspected, taken poison. His son Fedor reigned for a short time over a portion of the Russian dominions, but was murdered in June of the same year at Moscow.

GODWIN, FRANCIS, son of Thomas Godwin, bishop of Bath and Wells, was born at Havington, in Northamptonshire, in 1561. He was a student of Christ Church College, Oxford, in 1758, while his father was dean; he became B.A. in 1580, M.A. in 1583, B.D. in 1593, and D.D. in 1595. His earliest preferments were the rectory of Sandford Orcas, in Somersetshire, and the rectory of Weston in Zoyland, in the same county; he became sub-dean of Exeter in 1587; and then, on the resignation of Weston, rector of Bishop's Lidiard. His favourite study was ecclesiastical biography; and his chief work, 'A Catalogue of the Bishops of England,' was dedicated to Lord Buckhurst, who procured for the author the bishopric of Llandaff. A third edition, greatly enlarged, in Latin, dedicated to James I., was followed by his translation to the bishopric of Hereford in 1617.

In 1616 Bishop Godwin published a folio volume, entitled 'Rerum Anglicarum Henrico VIII., Edwardo VI., et Maria Regnantibus Annales,' which his son Morgan Godwin translated and published in English, fol., 1630. He died in the month of April, 1633. He wrote, also in Latin, 'Nuncius Inanimatus in Utopia,' 8vo., 1629, the design of which was to communicate various methods of conveying intelligence secretly, speedily, and safely.

(*Biographia Britannica;* Chalmers's *Biogr. Dict.;* Bliss's edit. of Wood's *Athenæ Oxon.*)

GODWIN, WILLIAM, was born on the 3rd of March 1756, at Wisbeach in Cambridgeshire, where his father was a dissenting minister. At first educated at Norwich by a private tutor, he was sent at seventeen to the dissenters' college at Hoxton, and in 1778, entered the ministry, and officiated for five years in the neighbourhood of London, to which he then removed, and sought subsistence by authorship. In 1793 appeared his 'Political Justice,' which excited great attention, at a time when the government were constantly prosecuting those who exhibited sympathy with the French Revolution. Godwin, in a passage of remarkable dignity, expressly anticipated the fate that might befall him, whilst however asserting the calm, peaceable, and thoughtful character of his work. He was not prosecuted, but his work subjected him to much obloquy. Next year appeared his novel of 'Caleb Williams,' which greatly increased his reputation.

Towards the close of 1794 some of Godwin's chief friends, Holcroft, Horne Tooke, Thelwall, Hardy, and others, were arrested, and brought to trial on charges of high treason. Godwin, who had refused to join all such revolutionary societies as those of which his friends were members, now by his pen rendered the most valuable aid to them, and it is thought contributed greatly to their acquittal.

In 1797 he published the 'Inquirer,' a collection of essays on moral and literary subjects. In April of the same year, he married Mary Wollstonecraft, after a previous cohabitation of six months.

She died in childbed in September of the same year, leaving a daughter, now Mrs. Shelley, the widow of Shelley the poet. In 1798 Godwin edited his wife's works, and published a small memoir of her. The novel of 'St. Leon' was published in 1799. The following year he visited Ireland, where he resided principally with Curran. In 1801 he married again. His life of Chaucer appeared in 1803; and his third novel, 'Fleetwood,' in 1804. About this period he became a bookseller, and wrote many school-books under the name of Baldwin. His other works were an 'Essay on Sepulchres,' in 1808, the novel of 'Mandeville,' in 1816, the 'Treatise on Population,' in reply to Malthus, in 1824; the 'History of the Commonwealth,' 1824 to 1828; 'Cloudesley,' a novel, in 1830; 'Thoughts on Man,' in 1831; and lastly the 'Lives of the Necromancers,' in 1834, written at the age of seventy-eight. His circumstances for some time before his death were rendered comfortable by a situation in one of the public offices, conferred on him by the Grey ministry. He died on the 7th of April, 1836.

GODWIN, MRS. *Mary Wollstonecraft*, the first wife of William Godwin, was born on the 27th of April, 1759. Her father owned a small farm in Essex, and is said to have practised as a surgeon, about the period of her birth at Loddon, in Norfolk. In 1768 he removed to another farm near Beverley, Yorkshire. In 1774 he came to London, where he had engaged in a commercial speculation, and resided at Hoxton. Mary's early life was not happy. Her father was a man of no judgment and of ungovernable temper. She determined therefore to provide for herself. She first went to live with a lady as companion at Bath, and in 1783 she opened a day-school at Islington (subsequently removed to Newington Green) in conjunction with two sisters and a friend. The call of friendship having induced her to go for a time to Lisbon, the school was mismanaged during her absence, and given up on her return. She then became a governess in the family of Lord Kingsborough. Her first work, 'Thoughts on the Education of Daughters,' was published in 1786. She quitted Lord Kingsborough's family in 1787, and entered into literary engagements with Mr. Johnson, the publisher. A translation of Lavater's 'Physiognomy,' and several articles in the 'Analytical Review,' were among her labours. She then mainly contributed to support several members of her family, the father included, who had fallen into great pecuniary embarrassment. Her answer to Burke's 'Reflections on the French Revolution,' and her 'Vindication of the Rights of Woman,' first brought her into notice and reputation. In 1792 she went to Paris, where she wrote her 'Moral and Historical View of the French Revolution.' A visit to Norway in 1795 gave rise to her 'Letters from Norway,' which were written during a period of extreme mental anguish, occasioned by disappointment in an attachment formed in Paris. In the beginning of 1796 she became acquainted with Godwin, and, having been married to him in 1797, died in childbed the same year.

GODWIT. [Scolopacidæ.]

GOES. [Beveland.]

GOES, HUGO VANDER, a celebrated old Flemish painter and pupil of John Van Eyck, was born either at Bruges or Antwerp. After studying in Italy, he settled at Ghent, where he conducted the festival at the inauguration of Charles the Bold as Count of Flanders, July 27, 1467. He is supposed to have resided at Ghent on account of his love for the beautiful daughter of a citizen named Jacob Weytens, in whose house Goes painted his celebrated picture of David and Abigail, and introduced the lady's portrait into it. They were understood to have been married, and he seems to have survived her, for he entered the Augustine convent of Roodendale, near Brussels, about 1480, where he became a canon, and where he died. Vander Goes excelled in painting women, and in the qualities generally of the Van Eyck and old Flemish school. One of his masterpieces is the Crucifixion in the church of St. James, at Bruges, which was saved during the puritanical rage of the sixteenth century by being coated with black, and having inscribed on it the Ten Commandments. It was cleaned when the danger was past.

GOETHE. [Göthe.]

GOGUE'T, ANTOINE YVES, born at Paris in 1716, followed the profession of the law, and became counsellor to the parliament of Paris. He applied himself closely to literature and especially to historical studies. The result of his researches appeared in his work, 'Origine des Lois, des Arts, et des Sciences, chez les Anciens Peuples,' 3 vols. 4to., Paris, 1758. Goguet died soon after the publication of his work, leaving part of the materials of another, on the origin and progress of the laws, arts, and sciences in France, from the establishment of the monarchy.

GOITRE. [Bronchocele.]

GOLCONDA. [Hindustan.]

GOLD is a metal which has been known from the remotest antiquity, and has been universally employed as a medium of exchange. Although the quantity of gold which is found, when compared with that of other metals, is small, yet it occurs in greater or less abundance in almost every part of the globe. It occurs in the native state, and combined with silver, and frequently mixed with metallic sulphurets and arseniurets. The greatest quantity of gold is the produce of South America; the richest mines of Europe are those in Hungary, and of Asia, in Siberia; it has been found also in North America; in the sands of the Rhône, the Rhine, and the Danube; small quantities are occasionally found in the stream tin-works of Cornwall, in Wicklow in Ireland, and in the Lead Hills in Scotland. In 1826 one piece of native gold was found in Siberia weighing 26 lbs.

Native gold occurs crystallised, capillary, and massive; the primary form is a cube. Gold not unfrequently occurs alloyed with silver, and this compound, where the quantity of silver is considerable, is known by the name of *electrum*. Gold is separated from the various substances with which it is mixed by the process of amalgamation; this consists in combining it with mercury, and heating the amalgam formed, so as to distil the mercury,

which is thus repeatedly used for the same purpose.

Gold is of a fine yellow colour, and is susceptible of a high degree of polish. It is nearly as soft as lead; its specific gravity is 19·3, and its atomic number about 199. For its malleability, see GOLD-BEATING. It is also exceedingly ductile; a single grain may be drawn out into 500 feet of wire. Gold suffers no change by exposure to air or moisture, even when heated. It melts at about 2016° of Fahr., according to Daniell's pyrometer; when in fusion, it appears of a brilliant green colour.

Oxide, or *Protoxide, of Gold* is a greenish powder, very unstable, and consisting of $G^1 O^1$. *Peroxide of Gold*, consisting of $G^1 O^3$, is a blackish yellow precipitate: it has many of the combining properties of an acid. *Protochloride of Gold*, consisting of $G^1 Ch^1$, is a colourless saline mass, decomposable by boiling water. *Perchloride of Gold* ($G^1 Ch^3$) gives a yellow-coloured solution, which becomes nearly red by evaporation; it has an acrid and bitter taste, and stains the skin of a purple colour. *Bromide of Gold* is an intensely red-coloured saline mass. *Sulphuret of Gold* ($G^1 S^3$) is a black powder. *Phosphuret of Gold* is a brownish gray earthy substance. *Iodide of Gold* ($G^1 I^1$) is a yellowish-brown precipitate.

Most metals are susceptible of combining with gold to form *alloys*, of which the following are the chief. *Arsenic* and gold form a brittle gray substance. *Tellurium* and gold, but mixed also with a considerable portion of lead, occur in combination, constituting three varieties known as *graphic tellurium, yellow tellurium*, and *black tellurium*. *Antimony* and gold form a pale yellow finely grained substance. *Manganese* and gold form a pale brittle alloy. *Zinc* and gold yield a pale green alloy, very brittle. *Tin* and gold form a pale yellow alloy, slightly flexible. *Iron* and gold form an alloy of a pale yellowish-gray colour; it is very ductile, and may be rolled from the thickness of three quarters of an inch to that of a guinea. *Nickel* and gold form a brittle yellow alloy; as do *Cobalt* and gold. *Copper* and gold combine in all proportions, with little alteration of the colour of the gold; the density is diminished, but the hardness is increased. *Bismuth* and gold form a brittle yellow alloy. *Silver* and gold combine well; the resulting alloys are very ductile. Silver and copper are both used as alloys in gold coin. *Lead* and gold yield a very brittle alloy. *Mercury* and gold form an *amalgam* much used in the arts [AMALGAM; GILDING]. *Platinum* and gold form an alloy in which the colour of the gold is destroyed.

The *Salts* of Gold, formed by the combination of the metal with acids, are not much employed in the arts, and are mostly of an unstable character. A compound of gold with peroxide of tin forms the beautiful *purple powder of Cassius*.

GOLD-BEATERS' SKIN is prepared from the outer or peritoneal membrane of the large intestine of the ox, by successive processes of soaking, scraping, washing, alkalising, &c. The manufacture, called in France (where it is chiefly carried on) *boyauderie*, is an exceedingly dirty and offensive one; but the resulting product is a remarkably fine and beautiful kind of membrane.

GOLD-BEATING. This is a process whereby gold is brought to the state of very fine leaves, for use in various kinds of gilding. The remarkable ductility of gold—a quality possessed by it to a greater degree than by any other known substance—is here taken advantage of to the fullest extent, as a means of limiting the quantity of this costly material required on a given surface.

It is by a combined process of rolling and hammering that the attenuation of the gold is produced. An ingot of gold is milled or rolled, to a thickness of about $\frac{1}{800}$ of an inch; and this riband is then hammered. The hammering does not take place on the gold itself; but thin membranes are interposed between the hammer and the gold. These membranes are of three kinds: an outside covering of common parchment; a set of leaves made of very fine and smooth calf-skin vellum; and another set made of the gold-beaters' skin described in the last article. The riband of gold is cut up into small pieces, each measuring exactly an inch square; and 150 of these are beaten or hammered at once, interleaved between the membranes, until they are expanded to nearly four inches square. They are removed, cut into quarters, replaced between new membranes of gold-beaters' skin, and beaten again; they again expand to nearly four inches square, and are again removed, cut into quarters, and replaced between the skins. A third beating expands them nearly as before. The thickness of the film of gold, by this time, varies from $\frac{1}{200,000}$ to $\frac{1}{300,000}$ of an inch, according to the purpose to which it is to be applied. The attenuation may be rendered more intelligible by stating that 100 square feet of the leaf-gold weigh no more than an ounce—a result nearly as surprising as anything presented in the mechanical arts.

A certain greasiness which comes upon the interleaved membranes is removed by beating them between pieces of white paper. The beating of the gold is effected by hammers weighing from 10 to 16 lbs., on a smooth block of marble: 150 small squares of gold form the group or bundle for the first beating, 600 for the second, and 800 for the third.

Two other metals, silver and copper, have sufficient malleability to be brought into the state of thin leaves by hammering; and both are used to a limited extent in this state in the arts. But these metals would fracture long before such a degree of thinness could be obtained as in the case of gold; consequently leaf-silver and leaf-copper are thicker than leaf-gold.

GOLD-SEED. [CYNOSURUS CRISTATUS.]

GOLDBERG. [LIEGNITZ.]

GOLDEN NUMBER, so called from its having been formerly written in golden letters in the almanacs, is the year of the cycle of nineteen years in which the current year falls. To find it, add one to the year of the Christian æra, and divide by nineteen, the remainder is the golden number of the year: but, if there be no remainder, then nineteen is the golden number.

GOLDFINCH, the common name for the well-known and gaily plumaged songster, *Carduelis* of Gesner and others, *Fringilla Carduelis* of Linnæus, *Carduelis elegans* of Stephens, *Cardello* and *Cardellino* of the Italians, *Le Chardonneret* of the French, *Distelfink* (Thistlefinch), *Distelzeizig* of the Germans.

Mr. Gould, in his 'Birds of Europe,' states that this beautiful species, with one characterised by him from the Himalaya Mountains, *Carduelis caniceps*, and an undescribed species from China, should form, in his opinion, a restricted genus, from which he would exclude the *Siskin* and several others which have hitherto been associated in the genus *Carduelis;* indeed, the same ornithologist, in his 'Century of Birds from the Himalaya Mountains,' describes and figures a finch nearly allied to the *Aberdevine*, or *Siskin*, of Europe, under the name of *Carduelis spinoïdes*.

This bird is so familiar to most that a detailed description would be superfluous. The sexes are nearly alike, but the tints of the female are not so bright as those of the male. The young are clad in a comparatively simple plumage, in which brown predominates till their first change, and are then the 'Branchers' of the London bird-catchers.

In captivity the Goldfinch is prized more for its beauty, docility, and affectionate disposition, than for its song. It is frequently taught to perform a number of tricks, and we have seen one, exhibited by a German master of legerdemain, go through its part with great accuracy, feigning death at the proper moment, and lying motionless though a train of powder laid round it was fired.

Pennant is of opinion that this bird is the Χρυσομῆτρις (*Chrysometris*), *or* Χρυσομίτρις, of Aristotle.

Hybrids between the Goldfinch and hen Canary are not unfrequently to be seen in the shops of the London birdsellers.

GOLDING, ARTHUR, was born in London, of a good family, in the early part of the sixteenth century. In 1564 he was living in the house of Secretary Cecil in the Strand; and his dedications show him to have been patronised also by other men of station. His earliest known work was printed in 1562; his latest in 1587, three years after the death of Sir Philip Sidney, when he completed Sir Philip's translation of Philippe de Mornay's French treatise on the truth of Christianity. During this period he published about thirty works, chiefly translations; the most useful were the translations from the Latin classics. His Ovid, completed in 1575, is a spirited and not very unfaithful translation. Such works exercised an important influence on the dawning poetry of England.

GOLDO'NI, CARLO, was born at Venice in 1707, in the house of his grandfather, who was fond of the company of musicians and comedians, and thus Goldoni imbibed his theatrical tastes. He ran away from different colleges, in order to join strolling players; and even after having taken the degree of doctor at law at Padua, and practised as an advocate at Venice, he employed himself as stage-poet to a company of actors, and thus spent some years. In 1742 he left them, and began to practise as a lawyer at Pisa with great success; but again, on the appearance of another company, he resumed his occupation of stage-poet, and commenced in earnest his long-desired career as a reformer of the Italian stage, which was then chiefly characterised either by dulness or by licentiousness and absurdity. The only popular national species of play were the 'commedie dell' arte,' or 'à soggetto,' in which a mere outline of the plot was sketched out, and the dialogue was delivered nearly extempore by the actors, but with certain fixed and popular characters, called Maschere, from the masks worn by the actors. The principal characters were a Pantalone, Arlechino, Policinello, and a clown. These plays of course depended chiefly upon the mental resources of the actors; and their tendencies were towards both an immoral and an inartistic licentiousness. Goldoni, whilst often retaining the maschere in a subordinate position, raised his plays to the rank of regular comedy. His productions were very numerous; he wrote, at one time, sixteen plays in a single year. Notwithstanding the inequality of his works, he is confessedly the restorer of the Italian comedy. The species of popular play above spoken of found a powerful defender in Goldoni's time in Carlo Gozzi; and hence a great rivalry arose between the two. In 1761 Goldoni was invited to Paris by an Italian company, and there wrote many plays, some of which were in French, and he met with great success. His 'Bourru Bienfaisant' remains a standard play in France. Voltaire praised him, and Diderot borrowed from him. He was now relieved from the poverty in which he had lived by an appointment as teacher of Italian to the daughter of Louis XV.; and, after some years' service, a pension of 3600 livres was granted him. This was taken away at the Revolution, but restored by the Convention in January 1793. He died at Paris a few days afterwards. His complete works were published at Venice, in 44 vols. 8vo., 1794–5. He wrote his own Memoirs in French, in 3 vols.

GOLDSMITH, OLIVER, was born on the 10th of November, 1728, at a place called Pallas, in the parish of Forney and county of Longford, in Ireland. He was the fifth of the seven children of the Rev. Charles Goldsmith, who had married whilst very poor, and only received his first preferment, the rectory of Kilkenny West, in 1730, two years after the birth of Oliver. The future poet received the rudiments of education from a village schoolmaster; he was afterwards sent, at the expense of an uncle and of other relatives, to school at Athlone; then to Edgeworthstown, to prepare him for the university of Dublin, which he entered as a sizar in June 1744. Here his indolence and extravagance, and the injudicious violence of his tutor, prevented his advancement, and he did not obtain the degree of B.A. until February 1749, two years after the usual time. His father was then dead; but his uncle, the Rev. Thomas Contarine, fully supplied his place. By his advice Goldsmith applied for orders, but was rejected by the bishop, for what reason is unknown. The situa-

R.A.N.M.S.H.S. Mid. LIBRARY
Class No. B/orc-42
Accession No. 723
U.D.C. No: 4-2:81

tion of tutor in a gentleman's family was then taken, but soon thrown up in disgust. His uncle then furnished him with money to go to London, to study the law; but on his way he lost all his money in gambling at Dublin, and returned penniless. His uncle forgave him, and sent him in 1752 to Edinburgh to study medicine; whence, after two years, he went to Leyden, to complete his medical studies. He resided there a year, studying chemistry under Gaubius, and anatomy under Albinus, but indulging much in dissipation. From Leyden he set out to make the tour of Europe, trusting entirely to his wits for support. A well-known passage in the 'Vicar of Wakefield' is supposed to refer to this period. 'Whenever I approached a peasant's house towards nightfall, I played one of my most merry tunes, and that provided me not only a lodging, but subsistence for the next day.' He thus worked his way through Flanders, portions of France and Switzerland, where he composed part of his 'Traveller,' and the north of Italy. He remained at Padua six months, and may have there taken a medical degree. The news of the death of his uncle and benefactor caused him to return to England in 1756, after about twelve months' travel. At London he became an usher in a school; then an apothecary's assistant, until an old schoolfellow aided him to commence as a physician; and with this pursuit and literature he managed to subsist. In 1758 he lost an important medical appointment in India, through his rejection by the College of Surgeons. He next wrote for some months for the 'Monthly Review,' under the management of Mr. Griffiths, the proprietor. Much of his time after this was spent in literary compilations, &c., for the booksellers. We shall only mention his chief works. In 1759 he published his 'Present State of Literature in Europe;' in 1761, while under arrest for debt, he produced the inimitable 'Vicar of Wakefield,' for which Dr. Johnson obtained for him 60*l*., but which was not published for some time afterwards. The 'Traveller,' and the ballad of the 'Hermit,' appeared in 1765. His comedy of the 'Good-Natured Man' was produced with but moderate success in 1768. The 'Deserted Village' was published in 1769; and he then commenced his well-known histories of Rome, Greece, and England. On the establishment of the Royal Academy in 1770, Goldsmith became the Professor of Ancient History. 'She Stoops to Conquer' was produced in 1773, with the greatest success. One of his latest publications was his 'History of the Earth and Animated Nature,' published in 1774, and for which he received 850*l*. In the spring of 1774 he was taken ill with fever, which, aggravated by mental distress, caused by the poverty and debt into which improvident habits had plunged him, and by a wrong treatment, which his physician could not dissuade him from pursuing, ended fatally on the 4th of April. A monument to his memory was erected in Westminster Abbey, with a Latin inscription by his friend Dr. Johnson. The fullest and most recent biographies of Goldsmith are by Mr. Prior and Mr. Forster.

GO'LIUS, JAMES, was born at the Hague, in 1596. He was educated at the university of Leyden, where he studied the ancient languages, mathematics, theology, and medicine. He was appointed professor of Greek at Rochelle soon after he had attained his twenty-first year. He soon resigned this office, and returned to Leyden, where he devoted himself to the study of Arabic under Erpenius. When the United Provinces sent an embassy to the King of Marocco, in 1522, Golius accompanied it by the advice of Erpenius, in order to obtain a more accurate knowledge of the Arabic language. In 1624 Golius was appointed professor of Arabic on the death of Erpenius. In the following year he sailed to the Levant, travelled in Arabia and Mesopotamia, and returned home by way of Constantinople in 1629. During his absence he was appointed professor of mathematics. He resided at Leyden for the remainder of his life, and died on the 28th of September, 1667. The work which has given most celebrity to the name of Golius is his 'Lexicon Arabico-Latinum,' published at Leyden, 1653, in folio. He also compiled a Persian Lexicon, which was used by Castellus as the basis of the Persian Lexicon in his 'Lexicon Heptaglotton.'

GOLTZIUS, HEINRICH, a celebrated engraver and painter, was born at Mulbrecht, in the duchy of Julich, in 1558. He was first instructed by his father, who painted on glass, and afterwards studied design under Jacques Leonhard. He began to engrave early; some of his prints bear the date of 1578. He first settled at Haarlem, where he married. He then travelled through Italy, studied at Rome, under the name of Henry Bracht to avoid interruption, and at last appeared as a painter (it is said) at the age of 42, and produced from that time an immense number of works. His best were his Danaë, and the Crucifixion. His best engraving is the Boy and Dog, dated 1597. He died January 1, 1617. The most successful pupils in his school were Mathan, Saenredam, and Muller.

GOMAR, FRANCIS, was born at Bruges, on the 30th of January, 1563. After spending some time at the universities of Strasburg and Heidelberg, he came to England in 1582, and continued his studies at Oxford and Cambridge, at the latter of which he took the degree of Bachelor of Divinity in 1584. In 1587 he was chosen pastor of the Flemish church at Frankfort, and in 1594 professor of divinity at Leyden. He is principally known as the opponent of Arminius, who was appointed his colleague at Leyden in 1603. On the death of Arminius in 1609, and the appointment of Vorstius, who held similar theological doctrines, to succeed him, Gomar retired to Middelburg, where he remained till 1614, when he was elected professor of divinity at Saumur. Four years afterwards he settled at Groningen as professor of Hebrew and divinity, at which place he remained till his death in 1641. He was present at the synod of Dort in 1618. His works were printed at Amsterdam in 1645. As he took the lead in opposition to Arminius, those persons who agreed with him in condemning the opinions of Arminius were called Gomarists, and also Anti-

Remonstrants. They obtained the latter name from their opposition to the remonstrance which Arminius presented to the States-General in 1608. [ARMINIUS.]

GOMBROOM, called also *Bunder Abbas*, is a town situated at the entrance of the Gulf of Persia, opposite Ormuz. It once was flourishing, and carried on an extensive trade. The population is 3000 or 4000 Arabs. The houses are flat-roofed, the streets narrow and dirty. The best building in the town is the palace of the sheïkh, which was formerly a Dutch factory. The sheikh is dependent on the sultan of Muscat in Arabia.

GOMERA. [CANARIES.]

GONDAR, the capital of Abyssinia, is situated in 12° 36′ N. lat., 37° 32′ E. long., not far from the northern border of the plain which reaches from the northern shores of Lake Tzana to the table-land of Wogghera. It stands between the Angerab on the east, and the Gaha on the west. The town covers a considerable space of ground, but the larger portion at persent consists of ruins or tracts overgrown with canes. The inhabited portion does not consist of one continuous mass of buildings, but of seven isolated groups of buildings, lying at some distance from one another. The largest of these groups lies on the western side, and is only inhabited by Mohammedans; hence it is called Islambad; and not far from it is Etsheghebad. These two quarters contain half the population of the town. Over this space, and mostly among the ruins, a great number of churches are dispersed. It is stated that there are fifty. The houses have the shape of a cylinder, with a conical roof of straw. They are built of volcanic stones in their natural shapes, and they are cemented by a loamy earth. To the north of the town stands the palace of the emperor, or Negus, which was built by Fasildar in the seventeenth century. It is surrounded by a high wall surmounted by embrasures, and contains a large court-yard and several large buildings, now in ruins, except one of moderate size, in which the present emperor resides.

The number of houses in Gondar does not exceed 1000, and the population does not exceed 6500. With the exception of the numerous clergy, all the inhabitants are engaged in commerce; for the manufactures and other particulars of the town see ABYSSINIA. (Rüppel, *Reise in Abyssinien.*)

GO'NDOLA is the name given to the pleasure-boats at Venice, which are very numerous, and serve, in its canals, for persons of all classes to proceed from one district to another. The gondola is shallow, long, and narrow, looking, as Byron describes it, like a coffin in a canoe, owing to the black curtains, &c., of the cabin in the centre. The gondolieri once formed an important corporation, several thousands in number, and distinguished for their wit as well as for their skill and honesty. The number of gondolas has greatly decreased in consequence of the decline of the prosperity of Venice.

GONFALO'NE, GUNTFANO'N, a word of Teutonic origin, derived from *gund*, 'war' or 'fight,' and *fano* or *fahne*, a 'flag' or 'standard;' the two together mean a 'flag of war.' Both the French and Italians of the middle ages adopted the word, and the latter corrupted it into gonfalone, and called the officer whose duty it was to carry the ensign Gonfaloniere. We read of the Gonfaloniere as the commander-in-chief of the papal forces. The title of Gonfaloniere di Giustizia was given to a high magistrate of the Republic of Florence, appointed by the constitution 1292. The Republics of Siena and Lucca had also magistrates called Gonfalonieri; and to this day, in the papal state, the chief municipal magistrate of each town is called Gonfaloniere, and is elected every year by the communal council, subject to the approval of the delegate, or political governor of the province.

GONG, a Chinese musical instrument of percussion, made of a mixed metal of copper and tin, in form much like the cover of a large culinary caldron, being circular, varying from about fifteen to twenty inches in diameter, and having a rim of from two to three inches in depth. It is struck by a kind of drum-stick, the head of which is of hard leather. It is a very sonorous and powerful instrument.

GO'NGORA (LUIS GONGORA Y ARGOTE), was born at Cordova in 1561. He was sent at the age of fifteen to Salamanca to study law, but where he wrote instead jocose, amatory, and satirical poems. The struggle with poverty evidently embittered his sarcastic muse. In his forty-fifth year he took holy orders, and obtained a scanty prebend in the cathedral of Cordova. He tried however to improve his prospects by going to Madrid, where, after eleven years of wearisome expectation, he was made one of the chaplains of Philip III., in whose court he found his talents fully appreciated. A sudden illness subsequently deprived him of his memory, and he returned to his native city, where he died on the 24th of May, 1627.

Gongora brought into full fashion in Spain the extravagant notions of the Italian Marinists, and was the occasion of establishing two schools, which exceeded his pedantry, wild fancifulness, and artificial language, without possessing his power and brilliancy. A Romancero under the title of 'Delicias del Parnaso' contains all Gongora's *romances* and *letrillas*. The earliest German romances were imitations of Gongora by Gleim.

GONIATITES, an extinct group of fossil shells, belonging to the division of cephalopodous Mollusca. The species which it contains are usually arranged, by writers on organic remains, as a section of Ammonites; but their appropriate characters were never completely given till M. Von Buch, following Haan of Leyden, published his 'General Essay on the Sutures of Ammonites' (read to the Academy of Sciences at Berlin, in April 1830; translated in the 'Annales des Sciences Naturelles,' 1833). The great importance justly attached to this group, in reasoning on the succession of organic life on the globe, induces us to present somewhat more than an outline of its structure and geological history.

The families or genera of nautili and ammonites are seldom well understood by the conchological student, because the real distinctions between them are not the most apparent. The most constant of all the characters of ammonites

is the situation of the siphon, which, instead of perforating the disk of the transverse internal plates as in nautilus, touches and lies parallel to the inner face of the shell on the dorsal line. There is another obvious and generally complete distinction in the form of the sutures, or intersections of the transverse internal plates (septa) with the inner surface of the shell. In ammonites this suture is undulated, or angularly bent into lobes and sinuses; in nautilus, even or gently waved. The exceptions to this are few, but remarkable. *Nautilus ziczac* of Sowerby (Dr. Buckland's 'Bridgewater Treatise,' pl. xliii., fig. 3) has sutures waved as much as some true Goniatites, and there is in fact every degree of sinuosity in the edges of the septa of the nautiloid and ammonitic families.

M. Von Buch supposes the sinuous edges of the septa of ammonites to be necessarily derived from the dorsal position of the siphuncle. 'All the other differences,' says he, 'are derived from this capital distinction. The nautilus, which passes a very large siphon through the middle of the septa, appears sufficiently attached by this membrane to the basis on which it rests. There is no need of any other support, and the septa remain in general smooth and concave without sinuosities on the edges. The small dorsal siphon of the ammonites would not suffice to secure the animal from displacement on the surface of its cell.' Other supports are necessary, and they are found in the marginal lobes which the form of the animal impresses on the partitions of the chambers. These are generally six in number; one ventral, one dorsal, and two on each side. (Dr. Buckland's 'Bridgewater Treatise.')

Goniatites, and their allies, the *Clymeniæ*, appear entirely confined to the rocks of the carboniferous and other systems of strata. Only one species (*Goniates Listeri*, Sowerby) is mentioned as occurring in the coal-formation, and that in the lowest portion (near Bradford, Halifax, and Sheffield, Yorkshire). In the shales and limestones of the millstone grit and mountain limestone series of England and Ireland, Professor Phillips describes and figures 33 species; Beyrich gives (from Goldfuss) 2 others; Von Buch (*Gon. expansus*), 1 other: total in carboniferous system, 36 species.

In the strata presumed to lie below the old red sandstone occur many other species; at least so is the fact on the continent of Europe, though in Great Britain and Ireland they are but rarely met with in the primary and transition strata.

Twenty-six were described by Munster from the Fichtelgebirge alone; and Beyrich admits in his general summary (1837) as many as 36 species from the transition strata.

GONIO'GNATHUS, a genus of fossil cycloid fishes, from the London clay. (Agassiz.)

GONIO'METER (from two Greek words, *γωνία*, an angle, *μέτρον*, a measure) is the name of an instrument employed to determine the angles at which the planes of crystals are inclined to each other. [ANGLE; PLANE.] The common goniometer consists of two arms of metal, like the letter X, turning on a joint at the intersection. Two contiguous planes of the crystal are placed between the shorter arms, and a graduated arc between the longer arms serves to measure the inclination of the planes. As this instrument is incapable of affording results sufficiently accurate to determine the species to which a crystal belongs, we proceed to describe the more perfect instrument invented by Dr. Wollaston, and called the reflective goniometer. This instrument consists of a graduated circle mounted upon a horizontal axis, to one extremity of which is attached a moveable pin, having a slit for the purpose of receiving a small brass plate. To this plate the crystal is attached by means of a piece of wax, so that it may project beyond the edge of the plate. The pin (which is provided with a vertical and horizontal movement) is then raised or lowered until the reflection of any convenient object above appears to coincide with some other object beneath. The instrument being thus adjusted, the graduated circle is turned until a similar reflection is obtained from the contiguous side of the crystal. The arc which the circle will then have described will be equal to the supplement of the inclination of the crystalline planes; but, the margin of the circle being graduated in an inverted order, the true inclination is given without further computation, and may be read off with considerable accuracy. In turning the crystal, the direction of the edge common to its two planes should not be altered, and the rays in both instances should be reflected from that portion of the planes which is nearest to their common edge, otherwise the observation will be affected by parallax. By this instrument the inclination of planes, whose area is less than the 100,000th part of a square inch, may be determined, by means of a vernier, within a minute of a degree.

GONIOMETRY, the measurement of angles; a name which should be substituted for TRIGONOMETRY, if it were advisable to alter established designations.

GONIO'PHORUS (Agassiz), a genus of fossil Echinida, from the green-sand. (Morris's *Catalogue.*)

GO'NOPLAX, *Gonoplax Tribe, Gonoplacians*, a group of brachyurous Crustaceans, belonging to the family *Catametopes*, and placed by M. Milne Edwards between the *Ocypodians*, and the *Grapsoïdians*. This tribe is distinguished by the form of the carapace, which is either square or rhomboidal, and much wider than it is long. The eyes are seated on rather slender elongated peduncles; the internal antennæ are horizontal and exposed. The length of the anterior feet varies, but is often very considerable.

M. Milne Edwards divides this tribe into four genera.

1. *Pseudorhombila.*

Example.—*Ps. quadridentata.* Length, about two inches; colour, rosy red; locality, unknown.

2. *Gonoplax* (Leach).

Example.—*Gon. rhomboïdes.* Length, about an inch; colour, yellowish, mingled with red; locality, the Mediterranean and the ocean; keeps among rocks at considerable depths, and seems to live solitary. According to M. Risso it swims

with facility, and rises often to the surface of the water without ever coming out. Small fish and radiated animals constitute its food.

3. *Macrophthalmus.*

Example.—*Macr. transversus.* Length about ten lines; some hairs on the feet; locality, Pondichéry. (Milne Edwards.)

4. *Cleistotoma.* (De Haan.)

Example.—*Cl. Leachii.* Carapace smooth and hairless; fore-limbs very large in the male; thighs granulous above; length, 4 lines; locality, Red Sea.

Fossil *Gonoplacians* occur in the East Indies; some incrusted in argillaceous limestone; others in calcareous, argillaceous, and sandy stone.

(For details, see Demarest's *Hist. Nat. des Crustacés Fossiles;* also M. Milne Edwards.)

GONZA'GA, a historical family of Italy, which was originally of plebeian extraction, and took the name from their native village. Luigi Gonzaga, who was appointed Podestà of Modena in 1313, became captain-general on the murder of his patron, Bonacossi, lord of Mantua, in a conspiracy in which Luigi was concerned; and the year after the Emperor Louis of Bavaria made him imperial vicar of that city, of which the family became henceforward the hereditary rulers. A century later the head of the family assumed the title of Marquis of Mantua. During the war waged by the Italian League to drive the French under Charles VIII. from Italy, Gianfrancesco Gonzaga was at its head, and defeated the French at the battle of Tornovo, on the 6th of July, 1495. He was also present at the battle of Atella, and contributed to restore the Aragonese dynasty to the kingdom of Naples. When Louis XII. again invaded Lombardy, Gonzaga was compelled to do homage to him; and in 1509 he joined the League of Cambrai against the Venetians. His son Federigo, for his services against the French, was made Duke of Mantua by the Emperor Charles V., and obtained also in 1536 the marquisate of Monferrato. Federigo's brother, Ferrante Gonzaga, was made by the Emperor governor of the Milanese; and he founded the line of the dukes of Guastalla. Guglielmo, Federigo's son and successor, was hump-backed. He was a good prince, and cherished learning and learned men. His son Vincenzo shared in these views, and obtained the release of Tasso from the Duke Alfonso d'Este. After his succession to the ducal throne he abandoned himself to pleasure and indolence. He it is who is charged with the murder of Crichton who had been his preceptor. [Crichton.] He died in 1612. Francesco, his son, exerted himself to repair the errors of his father's rule; he died soon after his accession, and was succeeded by his brother Cardinal Ferdinando Gonzaga, and he by a third brother, Vincenzo, in 1626, at whose death, in 1627, the direct line became extinct. The ducal throne was then claimed by Charles, Duke of Nevers, son of Louis, brother of Guglielmo the hump-backed, and also by Charles's cousin, Gonzaga, a descendant of Ferrante Gonzaga (before named). Their dispute invited the Duke of Savoy to invade Monferrato, while the Emperor Ferdinand II. invaded Mantua as an imperial fief. Louis XIII. took the part of the Duke of Nevers, and thus an European war broke out. The French arrested the proceedings of the Duke of Savoy; on the other hand, Mantua was taken and pillaged, and its treasures of art dispersed. By the treaty of Ratisbon, 1630, peace was made, and the Duke of Nevers established both in Mantua and Monferrato. In 1635 he seized the principality of Correggio. He died in 1637. His grandson Charles succeeded; at first under the regency of his mother. He was weak and dissolute. He sold his French possessions to Cardinal Mazarin. He died in 1665, leaving an only son, Ferdinand Charles, under the guardianship of his mother. Ferdinand proved weaker and more dissolute even than his father. On the breaking out of the war of the Spanish Succession he allowed the French to garrison Mantua, and was put under the ban of the empire as a traitor; and, when the French left Italy, the Austrians took Mantua and annexed it to the Milanese. Ferdinand, having thus lost his dominions, retired to Padua, where he died in 1708, without issue. He was the last Duke of Mantua. All the other lateral branches also became extinct or dispossessed.

GONZALO, HERNANDEZ, DE CO'RDOVA, surnamed the Great Captain, was the second son of noble and wealthy parents at Montilla, near Cordova, in 1453. Having early lost his father, he was brought up by a knight called Diego Gárcamo, and soon distinguished himself by his military and fashionable accomplishments, and by his generosity. He became the chief ornament of the court of Queen Isabella. After various minor services, he aided in the defeat of the Portuguese at Albuera, and in the ten years' contest which ended in the conquest of Granada he played an important part, and terribly harassed and alarmed the Moors by his guerilla warfare. When Charles VIII. of France conquered Naples in 1495, Gonzalo was sent by Ferdinand the Catholic to expel the invaders, which he did with wonderful rapidity. He then received the name of the Great Captain from friends and foes. The French thus expelled, Gonzalo next aided the Pope against one Menoldo Guerri of Biscay, who, having received Ostia in trust from Charles VIII., distressed and starved Rome. Gonzalo stormed the fortress, brought Menoldo in chains to Rome, where Gonzalo obtained his pardon, and then, with a hint to the pontiff as to a reformation of his household and court, retired to his own country in 1498. Two years later he suppressed a revolt of the Moors, and obtained their pardon also as the reward of his victory. Charles VIII.'s successor, Louis XII., again strove to obtain possession for France of Milan and Naples. Ferdinand of Spain now agreed to share in the spoils. Gonzalo was sent to aid the Venetians; and Cephalonia was taken from the Turks in 1500. The King of Naples was deposed, and the Pope sanctioned the act. Gonzalo then gave up the estates he had received from the King of Naples for his previous services. Another act however caused him much repentance afterwards; he sent the Duke of Calabria a prisoner to Spain, in spite of an engagement to respect his liberty.

The partition of Naples soon brought the Spanish and French into collision, when Gonzalo drove the French out of the country, and reconciled the natives to Spanish rule. Ferdinand at last grew jealous of such brilliant successes, and, making common cause with his envious courtiers, would not be satisfied of Gonzalo's honour and devotion, but removed him from Italy in spite of the desires of the Italians. On his return he was almost worshipped by his countrymen, whilst treated with contumely by the king for whom he had done so much. He was kept in idleness; and even when the king's fears were aroused after the victory of Gaston de Foix over the new viceroy of Naples in 1512, and Gonzalo had been requested to organise an expedition, when all was ready the king's jealousy overmastered his fears, and he ordered the disbanding of the forces. Many of the volunteers had parted with all their property to prepare themselves; and Gonzalo, forgetting the bitterness of his own disappointment and humiliation, rewarded them in a princely style. He then wrote to the king a letter of bitter complaint. He died Dec. 2, 1515.

GOOD FRIDAY, the name given to the day of our Saviour's Crucifixion. From the earliest ages of Christianity it has been held as a solemn fast. It is in England only that it is known by the appellation Good Friday; its ancient and appropriate title was Holy Friday. Solemn offices are sung this day in the Roman Catholic churches, &c., accompanied by imposing ceremonials relating to the crucifixion, and the day is still held as a fast-day by the Church of England.

GOOD HOPE, CAPE OF. [CAPE OF GOOD HOPE.]

GOOD, JOHN MASON, M.D., was born on the 25th of May, 1764, at Epping, where his father was minister of an Independent congregation. He was educated at home, where he studied Latin, Greek, and French. When fifteen years old he was apprenticed to a surgeon in Gosport, on leaving whom he studied for a short time at Guy's Hospital, and in 1784 commenced practice in partnership with a surgeon at Sudbury. He met however with but slight success; and, in consequence of having engaged himself as security for a friend who failed, he was induced to remove to London in 1793, principally with a view of obtaining employment in literature. For a time his progress was very slow; but by perseverance he succeeded, and in 1820 found himself so well established, both in literary and professional fame, that he determined on taking the diploma of M.D. at Marischal College, Aberdeen. From this time to his death, which occurred in January 1827, after a long and painful illness, he continued actively pursuing the practice of medicine and the study of almost all branches of science and literature.

Dr. Good was a voluminous and learned writer on various subjects, principally religious and medical. For some time he edited the 'Analytical and Critical Review,' and contributed to a daily newspaper, as well as other publications of the time.

The extent and variety of Dr. Good's works are sufficient to indicate their character; they evince the greatest industry, with a retentive and orderly mind, and every mark of sincerity and piety; but they show that he was deficient in personal observation, and his medical writings especially are hence of far less value than the labour that must have been bestowed upon them might have given them, had it been better directed. His principal faculty seems to have been a facility of acquiring languages: he had learned Latin, Greek, and French in his father's school; while an apprentice, he acquired Italian, and soon after commenced Hebrew. He studied German, Spanish, and Portuguese; and afterwards, at different times, Arabic, Persian, Russian, Sanscrit, and Chinese. Of his knowledge of all these sufficient evidence is presented in unpublished translations, in reviews of their literature, and in the constant references made to works in those languages in his medical and other writings. A biography of Dr. Good was published by his friend Dr. Olinthus Gregory, in 1 vol. 8vo.

GOODENIACEÆ, a small natural order of Exogens, chiefly inhabiting New Holland, and in that country representing the Campanulaceæ and Lobeliaceæ of the northern hemisphere. They are in fact so nearly allied to the latter, that they can scarcely be said to differ in anything of importance. Nine or ten genera are all that this order contains. The prevailing colour of their flowers is yellow; and some of them are sufficiently handsome to be worth cultivation. They are all herbaceous plants, of no known use.

GOODYERA, a genus of plants belonging to the natural order *Orchidaceæ*, and the tribe *Limodoreæ*. One species of this genus, *G. repens*, is found in Scotland, principally in fir-forests.

GOORIA. [GEORGIA.]

GOOSE, GOOSE-TRIBE, ANSERINÆ, a sub-family of *Anatidæ*.

The True Geese, or *Anserinæ*, are placed by Mr. Selby ('Illustr. of British Ornithology') at the head of the family *Anatidæ*, with which he commences the Natatorial Order.

Mr. Swainson, in the 'Classification of Birds' (vol. ii.), considers that the *Anserinæ* constitute the rasorial sub-family of the whole group of *Anatidæ*. Although much nearer related, in Mr. Swainson's opinion, to the true ducks than are the flamingos (*Phœnicoptinæ*, Swains.), next which he places them, they are, he remarks, nevertheless much more terrestrial in their habits; and in their strong and high legs, fondness for grain and vegetables, and comparative shortness of wing, he traces many of the chief characters of the rasorial type. The first form, after quitting the flamingos, seems to him to be the natatorial genus *Cygnus*, which by its great length of neck and large-sized body softens down the interval between the *Ducks* and the *Phœnicoptinæ*. 'We next,' continues Mr. Swainson, 'come to the true *Geese*, forming the genus *Anser*, the typical division of the whole group, which contains most, if not all, of the usual subgenera.'

According to Mr. Eyton, the sub-family *Anserinæ* embraces the genera *Cereopsis*, Lath; *Chloephaga*, Eyton (*Anser Magellanicus* of

authors); *Bernicla*, Brisson; *Anser* of authors; *Cygnus* of authors; *Sarkidiornis* (*Carina regia*, Stephens); and *Chenalopex* (χηναλώπηξ) of the ancients.

With respect to the admission of the true Swans (*Cygnus*) into the Anserine sub-family, we humbly protest against it. At the same time we are free to confess that through two or three forms the geese and the swans seem to coalesce together. The forms to which we particularly allude are the Canada Goose and the Chinese Goose.

As a general rule the *Anserinæ* are far less decidedly aquatic than the swans (*Cygninæ*) or the ducks (*Anatinæ* and *Fuligulinæ*). Some indeed, as the *Cereopsis* of New Holland, are rather palustral than decidedly aquatic, and seem to form a link between the waders and the true natatorial order.

The geese are grazers; all are gregarious in their habits, and more or less migratory. The beak is strong, and more or less conical, covered with a coriaceous skin, with the exception of the nails (*dertra*) of the upper and lower mandibles. The edges of the mandibles are lamino-dentated; the lamellæ of the upper mandible exposed; those of the lower mandible covered by the projection of the upper one. Nostrils lateral, placed rather behind the middle of the bill, and pierced in the lower and front part of the membrane that covers the nasal furrow. Tongue broad, fleshy, and fimbriated. Wings long, ample, and tuberculated (Mr. Swainson says *comparatively short*—but he is wrong. Let any one measure the expanse of the wings of the common Wild Goose).

Mr. Selby thus expresses his ideas respecting the true Geese (under which he includes the Bernicles, differing from the rest only in inferiority of size, shortness of bill, and blackness of leg):—'From the central position of their legs, the moderate size of their feet, and the length of their tarsi, the geese walk readily on land, and are indeed much more frequently seen there than on the water. They swim, however, with buoyancy and ease, but rarely dive, and only in cases of great emergency; when wounded perhaps, or otherwise unable to escape. In diet they are graminivorous as well as granivorous, chiefly the former; and for cutting such kind of food the laminated structure of the bill is admirably adapted. For this purpose they seek the meadows of the interior of the country, and resort much to fields of young wheat and other grain. From the great development of wing, their flight is strong, and they make rapid journeys, as they fly at the rate of 50 or 60 miles an hour. In these flights they advance in a diagonal line, or in two such lines, meeting in a point like the letter V. They breed in the marshy districts of the countries to which they retire during the summer months, laying several eggs of a white or sullied white colour. The flesh of the species is well flavoured, and highly esteemed for the table; and in some countries certain kinds constitute the principal support of the inhabitants, being killed in immense numbers during their periodical flights, and prepared as food for the winter.'

The Anserinæ appear to be all migratory; those at least belonging to Europe and North America are so. In the beginning of spring they travel in long lines to the desert regions of the north, where they mate in pairs and rear their broods; in autumn they commence their journey southward.

Of the European species we may enumerate the following:—The Gray-Lag Wild Goose (*Anser palustris*, Flem.). The Bean Goose (*Anser ferus*, Flem.; *A. Segetum*, Steph.). [Bean Goose.] The White-Fronted Wild Goose (*Anser erythropus*, Flem.; *A. albifrons*, Steph.) The Pink-Footed Goose (*Anser phœnicopus*, Bartlett, in 'Proceeds. Zool. Soc.,' 1839, p. 3.) The Bernicle Goose, or Clakis (*Anser bernicla*, Flem.; *Bernicla leucopsis*, Steph.), [Bernicle Goose,] common to Europe, Asia, and North America. The Brent Goose (*Bernicla brenta*, Steph.), common to Europe and North America. The Red-Breasted Goose (*Bernicla ruficollis*, Steph.) The Snow Goose (*Chen hyperboreus*, Boie), a native of northern Europe and the regions of America.

To these we may add the Egyptian Goose (*Chenalopex Ægyptiaca*), found in south-eastern Europe, and also in North America; the Cereopsis Goose of Australia [Cereopsis], and others.

North America possesses some species peculiar to itself, as the Canada Goose (*Anser Canadiensis*) and the *Anser Hutchinsii*, Richardson.

We may also mention the Spur-Winged, or Gambo Goose, of northern and western Africa (*Anser Gambensis*, Ray; *Plectropterus Gambensis*, Leach.)

With regard to the further geographical distribution of this useful tribe, the reader will find *Anser Indicus*, Barred-Headed Goose, Lath.; *Anser melanotos*, Black-Backed Goose, Lath.; and *Anser Coromandeliana*, *Anas Girra*, Gray and Hardw., Girra Teal, Lath., in the catalogue of birds which were collected on the Ganges between Calcutta and Benares, and in the Vindhyian Hills between that place and Gurra Mundela, on the Nerbudda, by Major James Franklin, F.R.S., &c. ('Zool. Proc.,' 1830–31.) *Anser Girra* (*Anas Girra*, Gray), called the Cotton Teal by the Europeans in the Deccan, on account of the quantity of white in the plumage, appears also in the account of Col. Sykes's collection of birds from the Deccan. ('Zool. Proc.,' 1832.) *Anser inornatus* is recorded among the birds brought home from the Straits of Magalhaens by Captain Phillip Parker King, R.N. ('Zool. Proc.,' 1830–31.) Mr. Gould, in his 'Century of Birds from the Himalaya Mountains,' figures *Anser Indicus* as occurring there.

Some interesting information as to the tracheæ, &c., of *Anser Magellanicus* and the Egyptian Goose, given by Mr. Yarrell, will be found in 'Zool. Proc.,' 1833.

To enter into a detailed history of all the species which we have enumerated is, in a work like the present, impossible; yet a slight sketch of one or two of the most interesting may be admissible.

The common Wild Goose or Bean Goose (*Anser ferus*, *A. Segetum*), which is a common winter visitor to the open lands and coasts of our island, is not the origin of the domestic goose. This valuable bird is a descendant of the Gray-Lag,

which, before our great marshes were drained, bred regularly in England. It is now of rare occurrence, and is only met with in small flocks during the winter. On the Continent its geographical distribution extends over the central and eastern parts of Europe, Northern Asia, and some parts of Western Africa, where it inhabits the marshes, and the borders of lakes and inland seas. M. Temminck informs us that it seldom advances much beyond the 53rd degree of north latitude. It makes a coarse nest amidst rushes, &c., and lays from 6 to 12 eggs of a dull or dusky white. It is very watchful, and while the flock are feeding sentinels are stationed so as to command an extensive view, and these, on the slightest appearance of danger, utter a loud cry of alarm, upon which the whole flock takes to wing with incredible alacrity. They generally fly at a great elevation, either in single file or in the form of the letter V, the leader being occasionally changed. Their resting-place at night is either on the water or on some sand-bank, at a distance from the shore; but, even then, the safety of the flock is watched over by sentinels, as it is during their feeding time. For more full details see Pennant, Montagu, Bewick, Selby, Gould, Yarrell, &c.

With respect to the domestic relative of the Gray-Lag, little need be said. It has been kept in its reclaimed condition for centuries. Geese were domesticated in England when Julius Cæsar first visited our shores.

Common Goose (*Anser domesticus*).

The goose is valuable, not only for its flesh, but for its feathers also, and we are sorry to say that the system of plucking these birds alive is not obsolete. It would seem that they are usually plucked five times a year, first at Lady Day, for feathers and quills, and afterwards, at intervals to Michaelmas for feathers only. For more explicit details see 'Farmers' Library,' article 'Poultry.'

Had we space to spare, we might well fill it up by an account of the Snow Goose of the arctic regions; but, as it is, we must refer to the 'Fauna Boreali-Americana' of Dr. Richardson, to the Prince of Canino in appendix to 'Wilson's American Ornithology,' and to Gould's 'Birds of Europe.' This migratory species breeds within the Polar circle.

The Canada or Cravat Goose, a beautiful species of which numbers have been reclaimed, invites notice as a link between the geese and the swans, and the same observation applies to the Chinese Goose (*Anser Cygnoïdes*). Both these birds are kept as ornaments on our lakes and sheets of water. ('Farmers' Library.') The habits of the Canada Goose are described by Hearne, Pennant, Wilson, Audubon, Nuttall, Dr. Richardson, and other writers.

Canada Goose (*Anser Canadiensis*).

The Ægyptian Goose (*Chenalopex Ægyptiaca*) requires a passing notice, not only on account of its exquisite colouring, but because it was a sacred bird among the ancient Egyptians, who have left on their monuments its sculptured effigies in abundance. It is common on the banks of the Nile, and indeed is distributed over the whole of the vast continent of Africa. This handsome species breeds freely in confinement, and is often seen in the aviaries and on the ornamental ponds of those who take pleasure in collecting choice specimens of water-birds. It might be easily added to our list of domestic poultry. Its Greek name *Chenalopex* (Goose-Fox), and its Latin one *Vulpanser* (Fox-Goose), refer to its watchfulness and cunning. See 'Farmers' Library.'

GOOSE-GRASS. [GALIPEA.]

GOOSEBERRY, the *Ribes grossularia*, indigenous to Britain and some other European regions of cool temperature, and also to the mountains of North America, at an elevation of from 2000 to 3000 feet above the level of the sea, is the origin of the many hundreds of kinds of this wholesome fruit now in cultivation. Some authors refer the varieties to two species, *Ribes grossularia*, the rough Gooseberry, and *Ribes uva-crispa*, the smooth Gooseberry. Others consider the latter as being merely a variety of the former; and certainly this is most correct, since it has been proved, from the results of successive reproductions, that the rough will sometimes become smooth, and the contrary. The name of Gooseberry has most probably been applied from the fruit being made into a sauce, and used for young geese. The gooseberry will ripen in the extreme northern parts of

Britain, near the level of the sea; and in lat. 57°, even at an elevation of 900 feet, it acquires great perfection with regard to flavour.

It appears that the flavour is best where the low temperature of the north brings the fruit more gradually to maturity than it does in the south, where the fruit is in danger of being scorched, and where it ripens far too quickly to acquire the peculiar flavour which it attains in its favourite climate; and a different method of pruning and training ought to be practised accordingly. Thus, in the north, the branches should be left thin, so as to expose the fruit, and with the same view the spurs should be short. In the south the trees should not be laid so open, and the lateral young shoots, instead of being cut close in, immediately above the fruit-bud at their base, should have two buds left to produce leaves for shading the fruit in summer.

In the manufacturing districts of Lancashire, and the adjoining counties, the cultivation of the gooseberry has been brought to surprising perfection, at least as regards the size of the fruit; and this chiefly by the manufacturing classes, in consequence of prizes being awarded to successful competitors at the gooseberry-show meetings. Judging from the quality of the varieties grown for competition in this way, it appears that weight is the only qualification required; it is however much to be regretted that flavour is not also taken into account. From the neglect of this requisite, many of the fine Lancashire gooseberries are not at all worth cultivation except on account of their coming to a size sufficiently large for cooking earlier than the smaller. For this purpose those with smooth skins should be avoided, because the skins become tough in the process of cooking. For flavour, the smaller kinds are far the best, and indeed are the only sorts worth growing.

The pruning of gooseberries is performed any time during the winter, and before the sap begins to be in motion in the spring. The operation consists in removing all cross laterals, so as to leave the branches as nearly as possible at regular distances, round an open centre, except where the heat of the climate renders it necessary to retain branches in the centre for shade; and the points of these branches, where too extended or weak, should also be shortened to some well-situated bud. Very strong shoots, assuming the character of robbers, should be cut clean out, except such as may be occasionally wanted to supply vacancies. It is however better economy, with regard to the health of the tree, to pinch off the tops of these strong shoots in the summer, and thus prevent their monopolising the sap from the other parts. Suckers, on the same principle, should be prevented from growing at the root.

The branches in all cases should be pruned to a single terminal shoot. In short, the plant should exhibit a regular appearance, without any overcrowding in one part and deficiency in another.

GORCUM. [Holland.]

GORDIA'NUS, MARCUS ANTONIUS AFRICANUS, born under the reign of the first Antoninus, of one of the most illustrious and wealthy families of Rome, made himself very popular during his quæstorship by the great sums which he spent on games and other amusements for the people. He was proconsul of Africa in A.D. 237, when an insurrection broke out in that province against Maximinus, and the insurgents saluted Gordianus as emperor. He prayed earnestly to be excused on account of his great age, being then past eighty; but, the insurgents threatening to kill him if he refused, he accepted the dignity, naming his son Gordianus as his colleague, and both made their entry into Carthage in the midst of applause. The senate confirmed the election, and declared Maximinus and his son enemies to the country. But Capillianus, governor of Mauritania, collected troops in favour of Maximinus, and marched against Carthage. The younger Gordianus came out to oppose him, but was defeated and killed, and his father strangled himself. Their reign had not lasted two months, yet they were greatly regretted. The younger Gordianus was 46 years of age, was well informed, and had written several works. The senate elected Balbinus and Maximus in their place. [Balbinus.]

GORDIANUS, MARCUS ANTONIUS PIUS, grandson by his mother of the elder Gordianus, was twelve years of age when he was proclaimed Cæsar. The senate named him colleague of the two new emperors Maximus and Balbinus [Balbinus]; but, in the following year (A.D. 238), a mutiny of the prætorian soldiers took place at Rome, Balbinus and Maximus were murdered, and the boy Gordianus was proclaimed emperor. His disposition was amiable, but at the beginning of his reign he trusted to a certain Maurus and other freedmen of the palace, who abused his confidence, and committed many acts of injustice. In the second year of his reign a revolt broke out in Africa, but the insurrection was soon put down by the governor of Mauritania. In the following year, Gordianus married Furia Sabina Tranquillina, daughter of Misitheus, who was then placed at the head of the emperor's guards. Misitheus disclosed to Gordianus the disgraceful conduct of Maurus and his friends, who were driven from court. From that moment Gordianus placed implicit trust in his father-in-law, on whom the senate conferred the title of 'Guardian of the Republic.' In the next year the Persians, under Sapor, invaded Mesopotamia, and entered Syria. Gordianus set out from Rome at the head of a choice army, took his way by Illyricum and Mœsia, where he defeated the Goths and Sarmatians, and drove them beyond the Danube. Gordianus crossed the Hellespont, and landed in Asia, whence he proceeded to Syria, defeated the Persians, and drove Sapor back to his own dominions. The senate voted him a triumph, and also a statue to Misitheus, who died in the following year. In A.D. 244, Gordianus advanced into the Persian territory, and defeated Sapor on the banks of the Chaboras; but, while he was preparing to follow him, Philippus was proclaimed by the army his colleague in the empire. Gordianus consented; but soon afterwards Philippus caused him to be murdered. A monument was raised to him by the soldiers, at a

place called Zaitha, 20 miles east of the town of Circesium, not far from the left bank of the Euphrates. Gordianus was about twenty years old when he was killed. (Capitolinus, *Historia Augusta;* Herodian, book viii.)

GORDON, ROBERT, was born in Aberdeenshire, about the year 1580. He studied first at Aberdeen, and afterwards at Paris. On his father's death in 1600 he returned to Scotland, and succeeded to his ancestral estate of Straloch. At this time the vast collection of maps, and corresponding letter-press geographical and historical descriptions, projected by Blaeu of Amsterdam, was in progress. The part of Blaeu's Atlas, commonly called 'Theatrum Scotiæ,' was finished by Gordon in 1648, and forms one of the eleven volumes of that work. It contains forty-nine minute and highly finished maps of the various provinces of Scotland, accompanied by a description in Latin, full of the results of extensive and accurate research. Gordon died in 1661. The geographical papers which he had originally prepared were still more extensive than the work published by Blaeu. There is a large mass of them among the MSS. in the Advocates' Library, in the printed catalogues of which their titles will be found. His son, James Gordon, who seems to have assisted him in his geographical labours, put in the form of a narrative the materials which his father had left for a history of his own times, and the 'History of Scots' Affairs,' thus prepared, was printed in 1841, in three volumes 4to., for the Spalding Club.

(Chambers, *Biographical Dictionary of Eminent Scotsmen; Introduction to History of Scots' Affairs from* 1637 *to* 1641, by James Gordon, Parson of Rothiemay.)

GORDON, THOMAS, born at Kirkcudbright, about 1684, was educated at one of the Scotch universities, and came early to London, where he taught languages, and wrote on politics. It is said he was employed by the Earl of Oxford. At first his principles were democratic, and he published with Mr. Trenchard, a gentleman of fortune, 'Cato's Letters,' &c. After Mr. Trenchard's death, Gordon married his widow, and, it is stated, was gained over to the side of Walpole; he certainly held the office of Commissioner of the Wine Licences. He is chiefly known by his translations of the Latin classics into English; of which the Tacitus, 2 vols. folio, 1728–1731, is on the whole the best version in our language. He also translated Sallust, and Cicero's Orations against Catiline.

GORDON, WILLIAM (born at Hitchin, Herts, in 1729, died at Ipswich in 1807), an Independent minister, emigrated in 1770 to America, and in 1772 was appointed minister of a church in Roxbury, Massachusetts. He attached himself warmly to the revolutionary cause, and became chaplain to the provincial congress of the colony. After the conclusion of peace he returned to England, where in 1788 he published his 'History of the Rise, Progress, and Establishment of the Independence of the United States of America.'

GOREE, a small island near the western coast of Africa. It lies along the southern shores of the tongue of land with which Cape Verd projects into the Atlantic, 14° 17′ N. lat., and 16° 55′ W. long. The island consists of volcanic rocks, partly covered with sand, with which has been mixed vegetable mould brought from the continent. It belongs to the French, who have erected some fortifications and a small town; but its importance has disappeared with the abolition of the slave-trade on this part of the coast.

GORGE. [Bastion.]

GO'RGIAS, of Leontíni, in Sicily, a statesman, sophist, and orator, belongs to the most brilliant period of the literary activity of Greece, and has been immortalised by the Dialogue of Plato which bears his name. The dates of his birth and death are uncertain, but he is said to have lived to more than a hundred.

Gorgias came to Athens B.C. 427, to seek assistance for his native city, whose independence was menaced by Syracuse. In this mission he justified the opinion which his townsmen had formed of his talents and political sagacity, and upon its successful termination withdrew from public life, and returned to Athens.

To the 84th Olymp. is assigned the publication of his philosophical work entitled 'Of the Non-being, or of Nature,' in which, according to the extracts from it in the pseudo-Aristotelian work 'De Xenophane, Zenone, et Gorgia,' and in Sextus Empiricus, he purposes to show, 1st, that absolutely nothing subsists; 2nd, that, even if anything subsists, it cannot be known; and, 3rd, that, even if aught subsists and can be known, it cannot be expressed and communicated to others. In respect to the second, he urged that, if being is conceivable, every conception must be an entity, and the non-being inconceivable; while, in the third case, he showed that, as language is distinct from its object, it is difficult either to express accurately our perceptions or adequately to convey them to others. It is no slight merit to have been the first to establish the distinction between conception and its object, and between the word, as the sign of thought, and thought itself. By thus awakening attention to the difference between the subject and the object of cognition, he contributed largely to the advancement of philosophy.

Gorgias devoted himself to the practice and teaching of rhetoric; and his professional labours seem to have been attended both with honour and with profit. Besides some fragments, there are still extant two entire orations, ascribed to Gorgias, entitled respectively, 'The Encomium of Helen,' and 'The Apology of Palamedes,' two tasteless and insipid compositions, which may however not be the works of Gorgias.

GORGONS, GO'RGONES, are certain mythological personages, which were represented as three daughters of Phorcys, a marine god, and his wife Ceto. Their names were Medusa, Euryale, and Stheno. They were described as having great wings, sharp crooked claws, teeth like the tusks of the wild boar, and snakes instead of hair, and one eye among the three; and yet some poets have represented one of them, Medusa, as a very fascinating creature. (Ovid. 'Metamorphoses,' b. iii.) The Gorgons were represented as living in

the farthest west. They were said to have had the power of turning into stone all those who gazed at them. At last Perseus, the son of Jupiter and of Danaë, set out, assisted by Minerva, to encounter the Gorgons; he conquered them, and cut off the head of Medusa, from whose blood, dropping on the ground, the horse Pegasus was engendered. He then gave the head of Medusa to Minerva, who fixed it on her ægis or shield, which had the power of turning the beholders into stone.

GÖRLITZ. [Liegnitz.]

GORSE. [Ulex.]

GORT. [Galway.]

GORTZ. [Trieste.]

GOSHAWK. [Falconidæ.]

GOSPEL, derived from two Saxon words, which signify, like the Greek, *evangélion*, 'good news,' is used to denote the Christian system of religion, and especially the good news of the coming of the Messiah. Many books containing the life of Christ were in circulation during the first three centuries, and were known as Gospels, but only the existing four were acknowledged by the fathers as of divine authority. Of the others the chief were the Gospels according to the Twelve Apostles, the Hebrews or Nazarenes, and the Egyptians. The Gospel according to the Hebrews, which was written, it is supposed, in the beginning of the second century, in the Syrian language, is believed by some critics to be the original Gospel by St. Matthew. By other critics, this Gospel and that of the Twelve Apostles are thought to be identical, and also that this was the one great original narrative drawn up by the disciples around the person of Christ, from which Matthew, Mark, and Luke composed their Gospels. This view is supported by some of the most eminent German critics.

The Apocryphal Gospels extant are, 'The Gospel of the Infancy of Christ,' attributed to Thomas; the 'Gospel of the Birth of Mary;' the 'Protevangelion of James,' and the 'Gospel of Nicodemus.' These may be found translated in Jones's 'Method of settling the Canonical Authority of the New Testament,' 1736–7. Twenty-one others are referred to in the writings of the fathers.

GOSPORT. [Portsmouth.]

GOSSELIES. [Hainault.]

GOSSELIN, P. F. J., born in 1751, at Lisle. From 1772 to 1780, he travelled in different parts of Europe engaged in geographical and antiquarian researches. In 1799 he received a place in the cabinet of medals at Paris, which he retained till his death in 1830. His principal works are 'Géographie des Grecs analysée,' Paris, 1790, in quarto, with 10 maps, and 'Récherches sur la Géographie systématique et positive des Anciens,' 4 vols., Paris, 1798 to 1813, in quarto, with 54 maps. Gosselin also assisted in the French translation of Strabo, which was undertaken by the French government, and published at Paris, 1805 to 1819, in 5 vols.

GOSSON, STEPHEN, a native of Kent, was born in 1554. He entered Christchurch, Oxford, in 1572, and after taking his bachelor's degree removed to London, became a family tutor, and wrote three plays, which were never published. At the age of twenty-five he published one of the most curious, and the second in order of time, of the Puritanical tracts inveighing against plays and stage-playing. This was 'The Schoole of Abuse,' &c. (reprinted by the Shakespeare Society in 1841), and which was followed by other books on the subject. 'The Schoole of Abuse' and its successors were dedicated to Sir Philip Sidney who, according to Spenser, scorned the writer for his labour. In 1600 he obtained the rectory of St. Botolph, Bishopsgate. There exists a letter of Gosson's, dated 1616, in which, with expressions of respect, he recommends to Edward Alleyn the player three poor people for admission to Dulwich Hospital. Gosson died Feb. 13, 1623.

GOSSY'PIUM, a genus of plants of the order *Malvaceæ*, common to both the old and the new world, and which, from the hair, or cotton, enveloping the seed being so admirably adapted for weaving into cloth, is, after those affording food, one of the most important groups of plants. There can be no doubt that it is indigenous in America, as, besides the distinctness in species, specimens of cotton still attached to the seeds, as well as cloth fabricated from the former, have been brought by Mr. Cumming from the Peruvian tombs. Humboldt has moreover stated that it formed the only clothing of the natives of Mexico, and is of one the plants they most anciently cultivated. With respect to the old world, the almost universal use of cotton as clothing in the East is well known; and as the species, as far as ascertained by botanists, appear to be Indian and Chinese, the historical investigation is interesting, as proving an early communication between the civilised nations of remote antiquity. In later times, we learn from Arrian that muslin was exported from India to the Arabian Gulf, and from that country cotton was no doubt first made known to the rest of the world.

Pliny states that Upper Egypt produces a small shrub which some call *gossypion*, others *xylon*, bearing fruit like a nut, from the interior of which a kind of wool is produced, from which very white and soft cloth is manufactured. Had it been common in Egypt in the time of Herodotus, it could not have escaped him; as he says specially of the Indians, that they possess a kind of plant which, instead of fruit, produces wool of a finer and better quality than that of sheep: of this the natives make their clothes. Nearchus describes the dress of the Indians as being made of flax from trees. Theophrastus clearly describes the cotton with leaves like the vine as being abundant in the Island of Tylos in the Persian Gulf. Heeren, in his work on the 'Commerce of the Ancients,' comes to the conclusion that these plantations of cotton in the Island of Tylos were the result of the commerce with India, the true country of the cotton. The assertion of Rosellini that cotton was always employed for mummy-cloth is erroneous, as the result of numerous observations by Bauer, &c., with the most powerful microscopes of modern times, and every variety of mummy-cloth, has proved that it is invariably composed of linen, and not of cotton cloth. The one fibre is easily distinguished from the other,

that of cotton having a flat tape or riband-like appearance, with a series of twists, while the fibre of the linen has a round, tubular, and even-jointed structure. (J. Thomson in 'Classical Museum.')

The species of Gossypium occupy naturally a belt probably exceeding the torrid zone in breadth, but in a cultivated state we have cotton now extending on one hand to the south of Europe, and Lower Virginia, and even Maryland, in the United States of America; while, on the other, we have it as far south as the Cape of Good Hope, and in America to the southern parts of Brazil. Within these limits it may also be seen cultivated at considerable elevations. Baron Humboldt mentions having seen it even at 9000 feet of elevation in the Equinoctial Andes; and in Mexico, at 5500 feet. Dr. Royle states it as being cultivated in small quantities at 4000 feet of elevation in 30° N. lat. in the Himalayas. The localities suited to the production of cotton depend as much upon the climate as the soil, and also upon the specific peculiarities of the different kinds of cotton plants. That the production of cotton is so much influenced by external circumstances is not more remarkable than in many other cultivated plants: indeed we might expect it to be more so, from the susceptibility of this hairy development to the influence of situation.

It is remarkable that a genus so important for its product, and so long known, and with comparatively so small a number of species, should yet have these undetermined.

Several more species and many varieties have been since described by various authors. M. De Candolle, the most recent systematic author, admits thirteen species, and notices others.

G. herbaceum is, no doubt, the *Xylon*, or *Gossypium Antiquorum*, and includes also the *G. Indicum* of Lamarck, which would indeed be the preferable name for this species. This species and its varieties are those which are chiefly cultivated in India. It has been procured from China and the Malayan peninsula, and also from Egypt. *G. punctatum*, from Senegambia, is probably a variety. It is that which is cultivated in the Mediterranean region, and must have been the species taken to America from Smyrna.

G. arboreum, has its seeds covered with a fine silky yellowish white wool. It is found in the island of Celebes and in every part of India. It is noticed among lists of the plants of Arabia and also of Egypt. It is planted near temples and the habitation of Faqueers in India, and is stated to be sacred to the Hindoo deities, and therefore employed only for making muslin for turbans.

G. religiosum has black seeds covered with short tawny fur under long dirty-looking wool. There is considerable confusion with respect to the species which should be called *G. religiosum*. The distinguishing characteristic of what is considered such at present is the having tawny-coloured instead of white wool. There are at least two distinct localities for this kind of cotton, one Siam, the other China. From the latter country it was introduced both into India and America, under the name of Nankin Cotton.

G. hirsutum has its seeds clothed with firmly adhering green down under fine long white wool. This species is cultivated in Jamaica, according to Swartz, and would appear, from the description of the seed, to be the green-seeded Short-Staple, or Upland Cotton of the Americans.

G. Barbadense is extensively cultivated in the West Indies; and it is also the *G. vitifolium* of Cavanilles. It is one of the cultivated cottons of Egypt. It is very probable that the Sea Island, or Long-Staple Cotton, is a variety of this species, as its seeds agree in character. More than this it is not possible to say, as, among the numerous collections which London contains, strange to say, there are none in which genuine specimens of cultivated cottons, properly named, can be seen.

The principal supply of cotton for the British manufactures is from America; but recent inquiries before a parliamentary committee have shown that, with more careful preparation, cotton might be obtained at a low price and in almost any quantity from our Indian Empire. It appears also that cotton grown at Port Natal in Africa is found of excellent quality, and would repay cultivation. The climate of Greece is also said to be well adapted for the cultivation of the species of Gossypium used in the cotton manufacture.

GOTHA, formerly the capital of the duchy of Saxe-Gotha, upon the extinction of the direct line of ducal princes in 1825 came to the Duke of Saxe-Coburg. [SAXE-COBURG-GOTHA.] Gotha is on the river Leina, in 50° 57′ N. lat., and 10° 42′ E. long. It is one of the handsomest towns in Saxony, and since the ramparts have been laid out in public walks presents an open cheerful appearance. It has four gates, five public squares, sixteen principal streets, and above 1260 houses. The streets are well paved and lighted. The population is about 13,500.

The principal public building is the ducal palace of Friedenstein, which stands on the summit of a high hill, with a terrace like that of Windsor Castle, and is surrounded by gardens and pleasure-grounds. It contains the ducal library of 20,000 volumes, the national library of 60,000 volumes and 2000 MSS., a valuable collection of coins, an oriental museum, a gallery of 1500 paintings, and other treasures. The other buildings of note are—the arsenal, the old and new town-hall, house of assembly of the States, seven churches, and a gymnasium. Gotha is rich in educational institutions, and in asylums for the poor and sick.

The majority of the inhabitants are dependent on the court, the gymnasium, and the garrison, for their subsistence. The rest are engaged in the manufacture of muslins, cottons, porcelain, paper, cloth, linen, thread, yarn, camlets, tobacco, musical and surgical instruments, toys, pewter and japan goods, furniture, gunpowder, excellent saddlery, &c. Near the town is the fine Observatory, built by Duke Ernest II., on the Seeberg, a hill which is 1192 feet in height. It was the scene of the labours of Zach.

GÖTHE, JOHANN WOLFGANG VON, was born at Frankfort-on-the-Main, Aug. 28, 1749. The mental development of this extraordinary man may be traced by means of his own poetical account of his life in his 'Aus meinem Leben.'

His father was in respectable circumstances, and had a taste for literature and art. Religion, music, drawing, languages, and poetry occupied his thoughts at a very early age, and produced in him some interesting individual manifestations. Gretchen (Peggy), who gave a name to the heroine of 'Faust,' was his first love; but the connection was broken off, and he suffered severely from illness in consequence. Soon after his recovery he was sent to the university of Leipzig, where, instead of studying jurisprudence as was desired, he bent all his attention to poetry. A little piece called 'Die Laune des Verliebten' (the Lover's Humour), and a comedy called 'Die Mitschuldiger' (the Accomplices), next appeared. Having made some attempts at etching, the acid exhalations injured his health; and in order to recover it he was sent to the residence of a lady, named Klettenberg, the 'fair saint,' whose confessions are recorded in 'Wilhelm Meister.' Under her influence Göthe became a mystic, and had actually some thoughts of founding a new religion on the basis of the Alexandrine philosophy. He was thus led to the study of natural science; and, when he went to Strasburg in 1768 to finish his legal studies, he really attended only to anatomy and chemistry. In 1773, having returned home, he published his play of 'Götz von Berlichingen,' and in the following year the novel of 'Werther,' and became at once famous. The Prince of Weimar invited him to his court in 1775, made him a privy councillor in 1779, and took him with him to Switzerland, and ultimately included him in his ministry. In 1786 Göthe went to Italy, and stayed there two years. He declined honourable marks of distinction from different sovereigns; and died March 22, 1832, after a long life devoted almost entirely to science, literature, and art.

Göthe's chief works may be thus briefly noticed: 'Werther' was occasioned by the suicide of a young gentleman, named Jerusalem. The English translation gives little notion of its immense power and energy. 'Götz von Berlichingen' has for its subject the times of the Emperor Maximilian, and introduces the Fehmgericht, or secret tribunal of the middle ages. Sir Walter Scott translated this play at an early period of his career. The drama of 'Egmont' is immortalised by an exquisite female character, Clara. Göthe also wrote 'Clavigo,' a domestic tragedy, and 'Stella,' a sentimental comedy. 'Iphigenia auf Tauris' belongs to a class of works that he wrote later in life, on classic models, and is a masterpiece of its kind. 'Torquato Tasso' belongs to the same division. 'Wilhelm Meister's Apprenticeship' is a novel of a remarkable and indescribable kind, containing much admirable criticism and the character of Mignon, the original of Scott's Fenella, and Victor Hugo's Esmeralda. 'Hermann and Dorothea' is a charming story of humble life told in hexameter verse. 'Faust,' the most memorable of all Göthe's works, represents the agony of a student toiling after inaccessible knowledge, and then in despair plunging into sensuality. Göthe is the author of numerous other works, as well as of a great number of small poems, critical papers, &c. In natural science he was equally distinguished: for instance, his theory of colours, and his theory of Morphology, now admitted by botanists to be true, which shows that the leaves and flowers of plants are identical in their origin, become different only under external influences, and will change into each other, under due alterations of those influences. Göthe's correspondence with Schiller, Zelter, and Bettine Brentano (a child) forms another interesting class of illustrations of this wonderfully rich, universal, and profound mind. He may be almost considered the creator of German literature, and his life as its history to the year 1832. A cheap and excellent edition of his works have been published at Paris in 5 vols. roy. 8vo.

GÖTHEBORG, or GOTHENBURG, a town in Sweden, situated on the river Göta-elf, about three miles from the Cattegat. Opposite the town the river widens to nearly one mile, and forms an excellent harbour. The town is traversed by numerous canals; these canals are crossed by twenty-one bridges, of which one is ornamented with gilded statues. The streets are regular, and intersect one another at right angles. The town is in a very thriving state, having increased its population during this century from 15,000 to 28,000. Its commerce is extensive and very active, especially with England. About 600 vessels are engaged in its trade with foreign countries, and nearly as many in that with other Swedish harbours. Its exports consist chiefly of iron and steel, timber, tar, and pitch. Many vessels are built here. The manufactures, though numerous, are on a small scale. Götheborg is the seat of the governor or landhauptman of Götheborg-Län, and of a bishop. It has many educational and charitable societies.

GOTHLAND, is an island in the Baltic, 70 miles long and 22 broad; it lies between 56° 55′ and 58° N. lat., and between 18° 10′ and 19° 20′ E. long. The population is about 40,000.

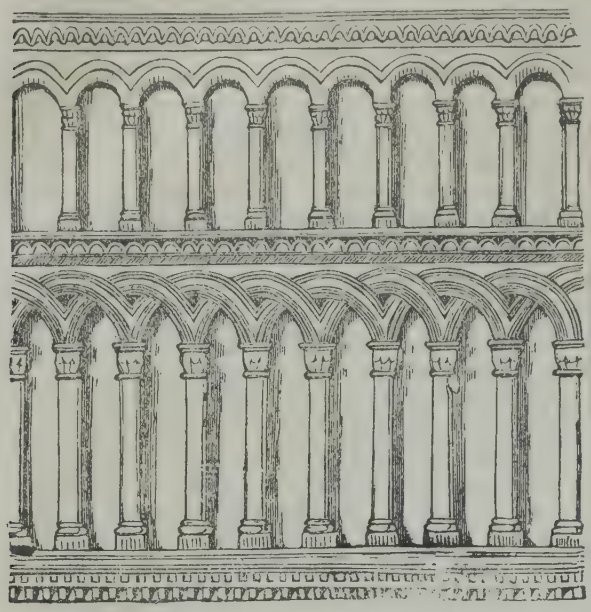
The surface of this island is hilly, and mostly covered with wood. The coasts are low, and generally unbroken. The principal articles of exportation are timber, wood, sandstone, marble, and lime. The soil is moderately fertile.

Wisby, the capital, and the seat of a bishop, is situated on the western coast, and contains about 4000 inhabitants. It was once a town of commercial importance; but its trade is now small. It has a fine Gothic cathedral, and a good grammar school.

GOTHIC ARCHITECTURE, sometimes called *Pointed Architecture*, refers to that style of architecture in which the pointed arch, applied in various ways, becomes a leading characteristic of the edifice. By some this arch has been derived from an avenue of over-arching trees, whilst others think that they see in interlaced wicker-work the type of Gothic architecture in all its chief forms. Unfortunately for these theories, the first stages of the style, where the imitation should be most conspicuous, present really the least resemblance to their presumed originals.

The more generally received idea is that which derives the pointed arch from the intersections of semicircular arches, as was the case in the

Norman style, which preceded the Gothic in England, and which formed one of the branches



Semicircular Arches. from Lincoln Cathedral.

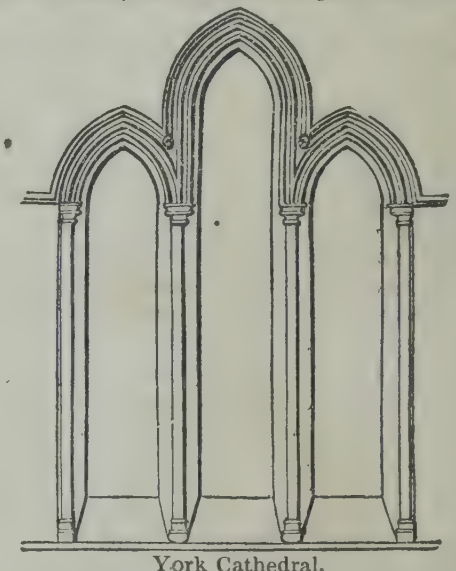
into which the Romanesque was divided; the others being the Saxon, the Lombardic, and the Byzantine. The Romanesque was at first a more corruption of the architecture of the Lower Empire, but gradually threw off all traces of the Roman orders, and acquired consistency as an independent style under the different names and modifications above named. In the oldest of these forms, the Byzantine, the cupola still remained as a distinct feature; and it is supposed there are instances, as at the aqueduct of Bourges, of the introduction occasionally, into the Byzantine, of the pointed arch as early as the seventh century: in such cases the arch is presumed to have been imported from the East. Lombardic architecture is noticed elsewhere. [LOMBARDIC ARCHITECTURE.] So also is the Norman. [NORMAN ARCHITECTURE.] There are very few specimens of Saxon architecture remaining, most of the existing examples of what is called Saxon architecture being in reality early Norman. The architects of the Anglo-Saxon period undoubtedly copied the Italian modes of building of the time, though they were far inferior to their originals. From these uncouth and unrefined structures the Normans appear to have rapidly developed the superior and more harmonious style which has been since known by their name, and which in its turn gave place to a still higher development—the Gothic or Pointed style.

England, France, and Germany, respectively, claim the invention of the Gothic; but all that can be safely asserted is, that it sprung up about the close of the twelfth century throughout the principal part of Europe. The transition from the Norman to the Gothic was somewhat sudden and abrupt; buildings commenced in the one were completed in the other; and these changes gradually extended even to the designs for the buildings themselves, and not merely to their details or decorations.

This is the reason why our larger Gothic buildings offer so many varieties of architecture. The architects were constantly experimenting and innovating; our cathedrals are therefore each of them a kind of visible history of the growth of architecture among us; and we are able to determine with tolerable accuracy the dates of their several parts, and the period of duration of the styles to which they respectively belong.

Different writers have differently classed the chief forms of the Pointed style. Dallaway divides them into five, viz. Semi or Mixed Norman, from 1170 to 1220; Lancet-Arched Gothic, from 1220 to 1300; Pure Gothic, from 1300 to 1400; Ornamented Gothic, from 1400 to 1460; and Florid Gothic, from 1460 to the extinction of the style, in the middle of the following century. Rickman, on the other hand, reduces the classes to three: Early English, from the end of the reign of Henry II. to the end of that of Edward I., or from 1189 to 1307; Decorated English, from 1307 to 1377, or a few years later; and Perpendicular English, from 1377 to the close. Thus we find that under the term Perpendicular he comprises both the Ornamented and the Florid Gothic of Dallaway.

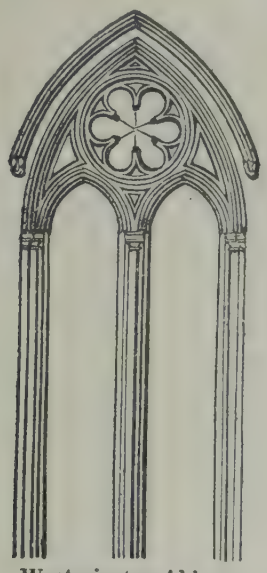
The first style of Rickman, the Early English, is characterised by the following features:—The arch, at first exceedingly acute, and applied chiefly where small spans were required, became gradually broader, as the aperture increased in width to which it was applied. The windows were lancet-headed, and narrow, and consisted first of a single opening, then of two openings combined together, and then of three, where the centre rose higher than the others, as in this example from York Ca-



York Cathedral.

thedral. Next we find the tops of such apertures surmounted by a circular window, and the whole combined within a larger arch as in the following engraving from Westminster Abbey: where also is illustrated the commencements of that ornamental tracery which became subsequently so rich and characteristic a feature of the Pointed style. The doorways, while similar in character to the windows, varied however greatly from them in proportions. While the former were generally tall, the latter were as commonly short; that is to say, the parts beneath the spring of the arch were

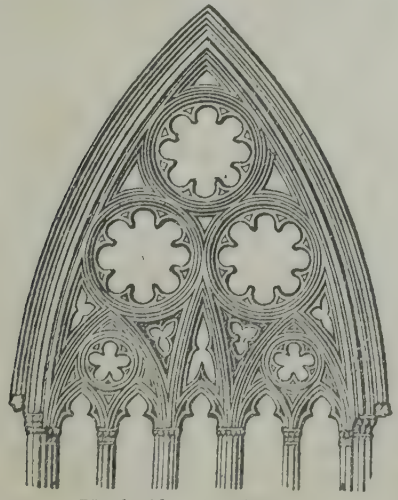
often long in the one, and short in the other, as compared with its breadth in both. The receding



Westminster Abbey.

sides, or splays of the doors, retained still the Norman depth, and were enriched with columns. The dripstone or projecting hood-moulding above the doorway rested, in many cases, on carved heads. The pier-arches—so called to distinguish them from arches in the walls—were lancet-shaped, and placed upon piers with shafts, giving somewhat of a clustering effect. The buttresses were narrower, and projected more than in the Norman buildings, and were divided into stages. The finest English specimen of this style is Salisbury Cathedral, begun in 1217, and finished in 1280. Lincoln and Westminster also present fine examples of it.

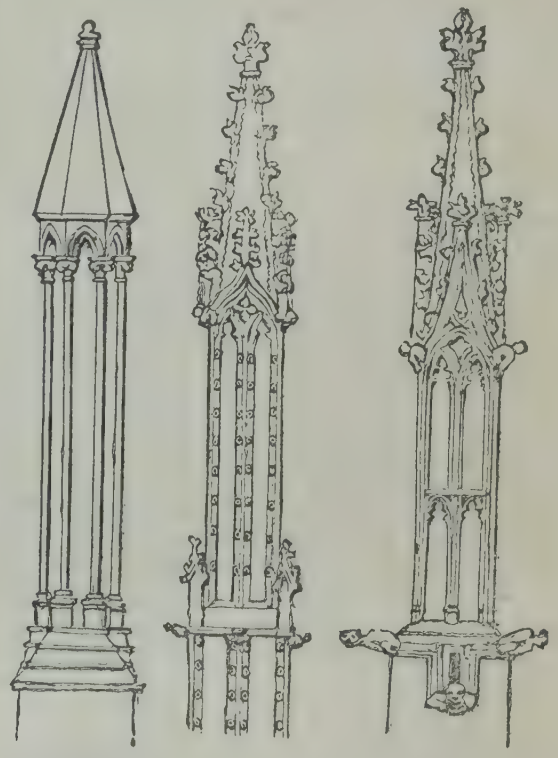
As to the second style, the Decorated English, Mr. Archibald M'Lellan observes, in his 'Essay on the Cathedral Church of Glasgow,' 'The most perfect state of Gothic architecture existed from the middle of the thirteenth to the beginning of the fifteenth century. Its characteristics are, the finely formed arch, included within an equilateral triangle; the clustered column, and better proportioned than heretofore; the mullions of the windows ramifying into rich tracery, arising out of



York Chapter House.

intersecting and reversed curves, assuming the form of flowers and leaves, and which has received the name of the decorated style of window; in others the mullions were perpendicular, but broken into compartments by horizontal bars called transoms, the divisions increasing in number as they ascend, until the space within the arch becomes as rich in decoration as the window just described.' The example just given from York Chapter House shows very distinctly and beautifully the progress of the more complex geometrical tracery referred to. We may add to Mr. M'Lellan's observations, that, as in the windows, so in the splays of doorways and in arch-piers, columns begin to be incorporated with the main pier or splay itself. The hood-mouldings were now often surmounted by other mouldings, forming a kind of gable, called a canopy, enriched with crockets or leaf-like ornaments on the outer edges. The pediment-heads of buttresses are often similarly decorated.

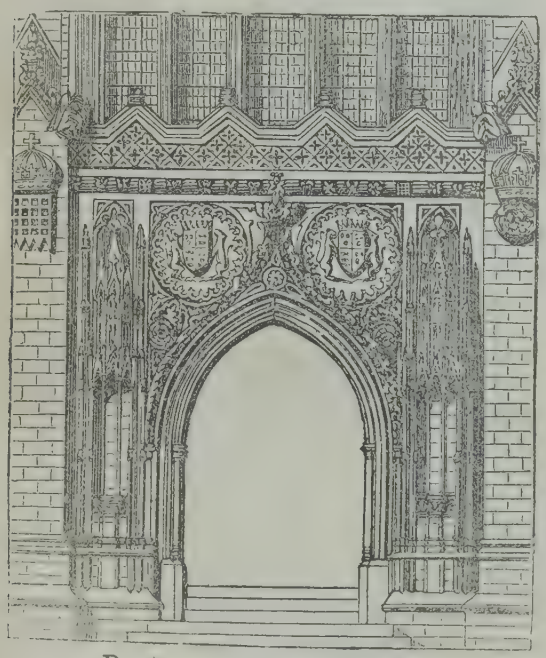
Pinnacles now increased rapidly in beauty and elaborateness. We give three examples: the first from Wells Cathedral, the second from St. Mary's, Oxford, the third from York Cathedral.



In the groined vaulting of roofs additional variety and richness were produced by the addition of intermediate ribs intersecting each other, so as to produce a kind of tracery consisting of stars and other figures. Among the finest examples of Decorated English are the choir of Lincoln (1324), the nave of York (completed in 1330), St. Stephen's Chapel, Westminster (begun in the same year), parts of the choir at Lichfield, &c., and, as a finished specimen of general composition, the west front of York, which, in regard to its outline and leading parts, has been imitated on a small scale in that of the Scotch church, Regent-Square, London.

The third class of the pointed style, which Rickman has named the Perpendicular, might, as far as regards the prevalence of particular lines, be more appropriately called the Horizontal. Thus, while the

mullions of windows and the ornamental panellings run very much in perpendicular lines, the numerous transoms, square-headed labels to doorways, and ornamental string-courses and cornices, furnish abundant illustrations of horizontal lines. Indeed the most striking peculiarity of the style in its later developments is the extreme flattening of the arch, till in some cases the height is less than one-fourth of the span; whereas in the equilateral arch it exceeds that measure. This depressed arch is sometimes called the compound and four-centred, from its being struck from four centres, while the equilateral is struck from two only. The introduction of this arch, also known as the Tudor, marks, in the opinion of many, the period of the decline of the Gothic in the middle of the fifteenth century, when it appears to have been first brought into use. This third class of the Gothic is, in fact, divided into two distinct parts, by some critics, to mark respectively the use of the two-centred, and of the four-centred arches. The windows already mullioned and transomed in the one variety became still further enriched in the other, by the indentation or embattlement of the transoms. Architects now ran riot in decoration. The outline of the doorways became square by inclosing the arch within mouldings forming a label. In many instances, characteristics of the earlier and later manifestations of the Florid Gothic were preserved in the same design, as in the well-known doorway of King's College Chapel, Cambridge, where the two-centred arch is pre-



Doorway, King's College Chapel.

served in the midst of decorations that belong essentially to the period when the four-centred was chiefly used. The fan-tracery of roofs was now developed into wonderful beauty and splendour, of which the chapels of King's College, Cambridge, of Henry VII. at Westminster, and of St. George's at Windsor, are admirable examples. An interesting feature of this class of the Gothic is its gradual application to domestic purposes, for which it is admirably adapted both as regards its usefulness and beauty. Thus chimneys were first constructed as a means of decoration as well as for use; and it is worthy of remark that the Tudor is almost the only domestic style in which chimneys aid instead of deteriorating the architectural effect. Bay windows and oriels are both peculiar to the Tudor style; the first appellation referring to projecting windows which rise directly from the ground, the second to those which overhang the lower part of the building.

In this brief sketch of the subject we could not attempt to speak of towers, spires, lanterns, turrets, pinnacles, buttresses, and flying buttresses —of the various forms of gables—and also of embattled parapets; of chapels and chantries, shrines and screens, chapter-houses and cloisters, and many other things of the kind, any single one of which would afford matter for a longer article than the whole of the present one. Our silence must extend also to composition and plan, in respect of both of which Pointed Architecture offers hardly less variety than it does in its details and ornaments, the combinations it admits being inexhaustible; whereas in Greek temples we meet with only one or two slight changes of the same idea. In this respect the difference between the two styles is palpable enough, but nowhere does it display itself so strikingly as within. Rarely indeed was the interior of a Greek temple more than a simple oblong apartment, so that a single drawing would suffice to convey a clear idea of the whole of it, and likewise of nearly every other interior. [CIVIL ARCHITECTURE.] Of a Gothic cathedral, on the contrary, the interior would, in many cases, require at least fifty drawings from as many different points of view, in order to show it completely and so that no part should remain undescribed, nor any of its varied effects left to be conjectured from what is shown by sections.

GOTHIC LANGUAGE. The Gothic language or languages is or are a branch of the Teutonic family. The Altgotisch, or old Gothic, was the language of the Goths who lived near the banks of the Lower Danube in the fourth century, and for whom Ulphilas made a translation of the Gospels. [ARGENTEUS CODEX.] Ulphilas was bishop of those Goths who lived in Mæsia in the time of the Emperor Valens, and the language of his version has been styled Mæso-Gothic. He is supposed to have formed the characters, with slight variations, from the Greek and Latin capitals. Another branch of the Gothic or Gotho-Teutonic language existed in Scandinavia, which German philologists have called Altnordisch, or old Norse, and in which the 'Edda' is written, and which is still spoken with some variations in Iceland, the Faroe Islands, and parts of Norway. Out of this language the modern Swedish, Danish, and Norwegian sprung. The old Scandinavian, or Norse, or Suio-Gothic, is considered by Adelung as a mixture of Gothic with the language of the Sveones, the original inhabitants of the Scandinavian peninsula previous to the immigration of the Goths; and the modern Swedish, which is derived from the old Scandinavian, appears to have elements in it foreign to the Teutonic, though the Teutonic, or Gothic, greatly prevails in both.

GOTHOFRE'DUS, DENYS GODEFROY, born at Paris in 1549, studied at Louvain, Cologne, and other universities, and was made councillor of the Châtelet at Paris. Being obliged to leave France on account of the persecutions against the followers of the reformed religion, which he professed, he went to Geneva, where he was made professor of law in 1580. In 1589 Henri IV. appointed him bailli, or governor, of the district of Gex, bordering upon Geneva, but he was driven thence by the arms of the Duke of Savoy, on which occasion he lost his books. In 1594 he was appointed to the chair of law at Strasburg, and in 1604 he removed to Heidelberg, where he filled the same professorship. In 1621, being driven from Heidelberg by the war in the Palatinate, he withdrew to Strasburg, where he died in the following year, with the reputation of being the first jurist of his age. His edition of the 'Corpus Juris Civilis,' 2 vols. fol., has often been reprinted; the notes are valuable. His other juridical works are numerous; and he also wrote on classical literature. His minor works, 'Opuscula,' were published together in one vol. fol. Sénebier, *Histoire Littéraire de Genève*, gives a catalogue of all the works of Denys Godefroy, with a biographical notice of the writer.

GOTHOFRE'DUS, JACQUES GODEFROY, son of Denys, was born at Geneva in 1587. In 1619 he was appointed professor of law at Geneva, and afterwards was made councillor of state, and was sent upon several foreign missions. He was deeply versed in jurisprudence, and an accomplished classical scholar. His principal work, about which he laboured for 30 years and which was published after his death, is his edition of the Theodosian Code, promulgated by Theodosius II., A.D. 438. This Theodosian Code contains the constitutions of 16 emperors, from the first Constantine to Theodosius himself; it is divided into 16 books, and the laws are arranged in chronological order. An abridgment of this code is contained in the 'Breviarium.' [BREVIARIUM.] The edition of Gothofredus, entitled 'Codex Theodosianus cum perpetuis Notis,' 6 vols. fol., 1665, is a master work of its kind. To the text of the code Godefroy subjoins the ancient explanation, followed by his own notes, in which he adverts to the various readings, and to the parallel or conflicting passages in the Theodosian and Justinian Codes; and he completes the illustration of each title by an ample commentary on the scope and tendency of the various enactments. The last volume contains 'Notitia Dignitatum seu Administrationum tam Civilium quam Militarium Imperii,' a 'Prosopographia,' or notice of all persons mentioned in the code, a 'Topographia, sive Orbis Romanus ex Codice Theodosiano descriptus,' and a 'Glossarium Nominum Codicis Theodosiani.' Gibbon, in the 'Memoirs of his own Life,' acknowledges his great obligations to Godefroy's labours while composing his 'History of the Roman Empire.' J. D. Ritter republished this edition of the Theodosian Code with various additions, in 7 vols. fol., Leipzig, 1736–45. Since that time inedited fragments of the Theodosian Code have been discovered in the Ambrosian and Turin libraries, which supply defects in the first five books. The other works of Jacques Godefroy are very numerous. His juridical works, except his illustrations of the Theodosian Code, were collected by Trotz, fol., Leyden, 1733, with a notice of the author. See also Sénebier, *Histoire Littéraire de Genève*.

GOTHS, GOTHI, a powerful northern nation. The name 'Goths' appears first in history in the third century, and it was then used by the Roman writers as synonymous with the more ancient one of Getæ, a people who lived on the banks of the Lower Danube. The Greek writers generally considered the Getæ, or Goths, as a Scythian tribe. The Getæ are mentioned in the time of Augustus as living on the banks of the Danube; and, a century later, Tacitus mentions the Gothones inhabiting the shores of the Baltic as a German tribe, while he considers the Gothini, who lived in Southern Germany, as Celts or Gauls. About the middle of the third century the Goths crossed the Dniester and devastated Dacia and Thrace. The Emperor Decius lost his life in opposing them in Mæsia, A.D. 251, after which his successor, Gallus, induced them by money to withdraw to the Dniester. They then spread eastwards, and occupied the country about the Cimmerian Bosporus, from whence they sailed across the Euxine, occupied Trebisond, and ravaged Bithynia. In the year 269 they landed in Macedonia, but were defeated by the Emperor Claudius II. Three years after, Aurelian gave up Dacia to a tribe of Goths, supposed to be Visigoths, or Western Goths, while those who ravaged Asia Minor were the Eastern Goths, or Ostrogoths. Constantine II. allowed a part of the Goths of Dacia to settle in Mæsia, and it was for them that Ulphilas translated the Scriptures into Mæso-Gothic. [GOTHIC LANGUAGE.] About A.D. 375, the Huns fell upon the Ostrogoths, and drove them upon the Visigoths, who were living north of the Danube. The latter implored the Roman commander to allow them to cross that river, and take shelter in the empire. The Emperor Valens consented, and many of them were allowed to settle in Mæsia; but they soon quarrelled with the Romans, and defeated and killed Valens. From that time they exercised great influence over the Byzantine court. Towards the end of the fourth century, Alaric, king of the Visigoths, invaded North Italy, but was defeated by Stilicho near Verona. He came again however a few years after, and plundered Rome. His successor, Ataulphus, made peace with the Empire, and repaired to the south of Gaul, where the Visigoths founded a kingdom, from which they afterwards passed into Spain, where a Visigothic dynasty reigned for more than two centuries. The Ostrogoths, who had settled in Pannonia, extended their dominion over Noricum, Rhætia, and Illyricum; about A.D. 489 they invaded Italy under Theodoric, and defeated Odoacer, who had assumed the title of king of Italy, a title which Theodoric took for himself with the consent of the Eastern emperor. Theodoric was a great prince; but his successors degenerated, and the Gothic dominion over Italy was overthrown by Narses, the general of Justinian, A.D. 554. From that time the Goths figure no longer as a power in the

history of Western Europe, except in Spain. Their name was however perpetuated in Scandinavia, where a kingdom of Gothia existed till the twelfth century distinct from Sweden Proper, until both crowns were united on the head of Charles Swerkerson, A.D. 1161, who assumed the title of king of the Swedes and the Goths, which his successors bear to this day. On the early history of the Goths, see Jornandes, *De Getarum sive Gothorum Origine et Rebus Gestis;* Isidorus, *Chronicon Gothorum;* Procopius, *De Bello Gothico.*

GÖTTINGEN, a principality of the kingdom of Hanover, lies between 51° 19′ and 51° 53′ N. lat., and 9° 24′ and 10° 9′ E. long. Its area is about 640 square miles, and it contains seven towns—GÖTTINGEN; Nordheim, a manufacturing town on the Ruhme, with 3700 inhabitants; Hannöverisch-Münden, at the confluence of the Werra and Fulda, another manufacturing town, with about 4600 inhabitants; Dransfeld, with about 1400; Hardegsen, with about 1300; Moringen, with about 1600; and Uslar, a mining and manufacturing town, with about 2000. The principality has also seven market villages and about 330 other villages and hamlets. The surface presents a continued succession of hills, offsets of the Harz Mountains, with larger or smaller valleys between them. It is watered by the rivers Weser, Leina, Nieme, &c. The soil is fertile and well cultivated. There are large forests and good pastures. The mineral products are iron, salt, basalt, freestone, millstones, potter's and porcelain clays, coals, and alum. The manufactures consist of linen yarn and linens, iron and copper ware, deals, mirrors, glass, pottery, woollens, leather, paper, &c. The population (mostly Lutheran) is about 125,000.

GÖTTINGEN, the capital of the preceding principality, is situated in 51° 31′ N. lat., and 9° 56′ E. long. It is built on both sides of the New Leina, an artificial arm of the Leine. About the year 1360 it became a member of the great Hanseatic league; but it owes its modern celebrity to the university. The town is surrounded by ramparts, which have been levelled and planted with trees. It is divided into the Old Town, New Town, and Masch. It has four gates and some inconsiderable suburbs. It is in general well built, and the streets are mostly broad, straight, and paved with basalt. There are three squares or open spaces, five Lutheran parish churches, a reformed Lutheran church, a Roman Catholic church, a guildhall, and an hospital.

The chief establishment of Göttingen is the university, founded in 1734, and attended generally by about 1000 students. The King of Hanover is the Rector Magnificus, and one or more of his ministry are the curators: but the immediate control is vested in a pro-rector, one of the regular professors. It has four faculties: theology, law, medicine, and philosophy. The library contains upwards of 300,000 volumes and 5000 manuscripts. There is an ecclesiastical school, museums, and apparatus rooms, an observatory, chemical laboratory, an anatomical theatre and lecture rooms, a veterinary school, a clinical establishment and medico-chirurgical hospital, a philological seminary, a botanic garden and a nursery, and a hall, endowed with funds towards providing meals for poor students; the whole under the management of the senate and professors. There are yearly exhibitions, or stipends, for the benefit of students with slender means. Göttingen has also a royal society of sciences, a German society, a gymnasium, a school for females of the upper class, a school of industry, and other schools. The expenditure of those connected with the university forms the principal means of subsistence to the inhabitants; but they have also considerable manufactures of woollens, tobacco, leather, soap and candles, musical and scientific instruments, stockings, &c.

GOTTORP. [SCHLESWIG.]

GOTTSCHED. [GERMANY—*Language and Literature.*]

GOUDA. [HOLLAND.]

GOUGH, RICHARD, was born in London, Oct. 21, 1735. He became a fellow-commoner of Benet College, Cambridge, in July 1752, but left the University in 1756, without taking a degree. He was elected F.S.A. in 1767, and F.R.S. in 1775. His chief publications were his 'Anecdotes of British Topography,' 4to.; his elaborate edition of Camden's 'Britannia,' 3 vols. fol., 1789, for which he made regular excursions for years through the kingdom; his 'Sepulchral Monuments of Great Britain,' in two splendid folio volumes, completed in 1797, and his 'History of the Society of Antiquaries,' prefixed to the 1st volume of the 'Archæologia,' 1770, to which work he largely contributed. Mr. Gough died Feb. 20, 1809. He bequeathed to the University of Oxford all his printed books, MSS., and drawings, relating to British topography, to Northern and Saxon literature, to sepulchral monuments in France, &c.

GOUJON, JEAN, a celebrated French sculptor of the sixteenth century, called sometimes the Correggio of sculptors, from the softness and delicate roundness of his execution, especially in basso-rilievo, in which he was excellent; he is also sometimes termed the father of French sculpture. Many of his works have perished, but two of the best still remain in Paris: the bassi-rilievi of the Naiades of the Fontaine des Innocents, and the four colossal Caryatides in the Louvre, in the Salle des Cariatides so named from Goujon's works, built in the reign of Henri II. Goujon was also an architect, and was appointed, conjointly with Pierre Lescot, to superintend the building of the Louvre. Goujon was a Huguenot, and fell a victim to the massacre of St. Bartholomew, in 1572; he was shot while on a scaffolding, working upon some bassi-rilievi at the Louvre.

GOURD, a kind of fruit obtained from various plants of the natural order *Cucurbitaceæ.* In countries having hot and dry summers the different kinds of this fruit are held in high estimation, and are a valuable article of consumption, acquiring a very large size, abounding in nutritious matter, and being moreover very wholesome. The largest is the kind called Potiron Jaune by the French, which sometimes weighs above 2 cwts. The best kind of gourds belong to the genus *Cucurbita.*

Bottle gourds, which are bitter and dangerously drastic, are the fruit of *Lagenaria vulgaris;* while what is called the colocynth gourd, a powerful purgative, is in reality a kind of melon, the *Cucumis colocynthis.*

GOURDON. [LOT.]

GOURNAY. [SEINE-INFE'RIEURE.]

GOUT (*gutta*, a drop), *Arthritis*, or *Podagra.* It may be defined to be an inflammatory affection of the joints, arising from some peculiar morbid action in the system. It is mostly an hereditary disease, coming on without any evident external cause, generally preceded by disorder of the digestive organs, and accompanied by a plethoric state of the system. The inflammation attacks the smaller joints, particularly the first joint of the great toe, and returns at intervals, various joints or parts becoming affected after repeated attacks.

A paroxysm of gout is generally preceded by some constitutional disturbance, though it may attack a person suddenly who is apparently in good health. It is commonly ushered in by a disordered state of the whole system; the circulating, nervous, digestive, and secreting organs are all out of order. The pulse is frequent and full; there is a feeling of repletion and oppression, drowsiness, or restlessness; general lassitude and depression of spirits; flatulence; irregular appetite; costiveness; and high-coloured urine, which deposits lithic acid on cooling. Lithic acid is also found to exist in the blood. The local affection generally commences suddenly in the middle of the night. The patient is awakened at two or three o'clock in the morning with acute pain in the ball of the great toe, accompanied with a feeling of heat and stiffness of the part: chilliness and fever come on, which gradually abate as the pain increases, which becomes more violent every hour, having a burning or gnawing character. This generally continues till the middle of the following night, though in slight cases it may remit after a few hours' duration. A gentle perspiration then breaks out, and the patient falls asleep. The next morning the toe is shining, red, and swelled; the veins of the foot are very much distended, and the joint is excessively tender. Exacerbations, becoming less violent each time, recur for several nights, and then the attack declines. The joint remains swelled and weak for some days, and there is violent itching, followed by desquamation of the cuticle; after which all disease ceases, and the patient feels better, both in body and mind, than before the attack.

It is very common, when persons have had gout for a length of time, for various internal organs to become diseased. The inflammation may suddenly disappear from a joint, and some serious internal affection, as apoplexy or gastritis, unexpectedly make its appearance. This is called retrocedent or displaced gout. The internal affections which thus arise are often caused by the patient's imprudence, and sometimes by injudicious treatment, as the application of cold to the inflamed joint.

Gout is more frequently met with in persons of vigorous and robust constitutions than in those of spare habit, and is more common in men than in women: this comparative immunity of the female sex seems to be owing in a great measure to their more temperate habits of life. Persons of advanced and middle age are more liable to gout than those of early life. It does not commonly appear till after the age of thirty-five, though where the predisposition is strong it may occur even before puberty. Hereditary predisposition is doubtless one of the strongest causes of gout, and where this tendency exists the disease may take place under circumstances which would not otherwise have power to produce it. Hence persons who are conscious of an hereditary taint should guard with particular care against the causes which excite gouty action. Slight causes will bring on an attack of gout in those who are liable to it.

The occurrence of a paroxysm of gout often seems to relieve the general health for a time; and it is a common idea that an attack expels some morbid matter from the system. This idea has often led to very improper and even dangerous proceedings. On the contrary, the judicious plan of treatment in gout is to moderate the paroxysm and prevent its recurrence. With regard to the preventive treatment, we need only recommend temperance and exercise, which will generally succeed in keeping off a recurrence of the disease, and if strictly adopted will be a sufficient guidance to the gouty patient. Topical remedies are of little use. In addition to antiphlogistic treatment, we possess a remedy which certainly is highly valuable in gout, viz., colchicum. This medicine, when given in a sufficient quantity, generally purges the bowels, and lowers the pulse. Colchicum may be given with safety during a fit of gout, and it certainly seems to shorten its duration. Purgatives, blood-letting, and other remedies must however be had recourse to, according to the case.

Persons of a gouty habit are liable to certain inflammatory affections of the eye (dependent on the state of the constitution), which differ in some respects from inflammation of the same parts arising from other causes. In these cases a knowledge of the gouty condition of the system is of the first importance in the treatment of the disease.

GOVAZ. This is a misprint for *Goyaz.* [BRAZIL.]

GOVERNMENT is a word used in more than one sense. 1. It denotes the *act of governing*, as when we speak of 'the business of government;' 2. The *persons who govern* are called 'the government;' and we thus speak of 'the French government,' 'the Russian government,' &c.; 3. The word 'government' is used for the phrase *form of government*, as when we speak of 'a monarchical, aristocratical, or republican government;' or again of 'the English or French government,' meaning the English or French form of government, or the English or French constitution.

Of these three meanings of the word 'government,' the first and the last are the most important. Each of them presents a large field of inquiry; and correspondent to each of them is a science.

First, there is the science which relates to the business of government; and, secondly, there is that which relates to the form of government. The

first of these two sciences enumerates and classifies the operations of governing; the second, the forms of government; and as government has a certain end or purpose, the first seeks to determine how the operations of governing shall best be carried on, and the second how the government shall best be formed, with reference to the attainment of this end.

The science of government, in the first of the two senses, is more commonly called the science of legislation. So the art which flows from this science, or the art of governing, is called the art of legislation. [LEGISLATION.]

It is hardly necessary to explain the phrase 'form of government,' though, if it were necessary, many changes of phrase might be resorted to. Thus we might say that the form of government is but another and a shorter phrase for the mode of distributing the powers of government. Many other changes of phrase, which it is not worth while to enumerate, might be employed. Or we might explain the phrase by enumerating the various items which it comprehends. Thus, we might say that the number of the governors or governing bodies, their relations to one another (if more than one), and the modes in which they are severally appointed, are so many elements of a form of government.

As forms of government we find enumerated MONARCHY, ARISTOCRACY, DEMOCRACY; and forms mixed and compounded of them, as Constitutional or Limited Monarchies, as they are called. [CONSTITUTION; MONARCHY.]

The term REPUBLIC, which is sometimes limited to a Democracy, may be, and often is, used in a larger sense. In every state there is some supreme power, which is called the sovereign power, a notion that is often much misunderstood and ill conceived. [SOVEREIGNTY.]

All Government is supposed to exist, that is, all forms of Government are supposed to exist, for the purpose of the happiness of all, both those who directly exercise powers of Government and those who do not. A form of Government is a necessity, as the existence of society and of law generally is a necessity; by which is meant, that man's nature is such that he cannot exist except in some society and under some Government. The existence of Government is therefore in conformity to the will of God; and each particular form of Government is so. Government is one of the means of God's moral government of the world, the nature of which is such as not to produce universal happiness to all, or perfect happiness to any; and we therefore conclude that it is not God's will that man should ever attain perfect happiness. Indeed the nature of man's constitution and the nature of society prevent the attainment of this perfect happiness. But as man desires happiness, and as society and Government are conditions under which he must live, the nature of the society and the Government are important elements towards his happiness. Yet the form of Government is not a matter which can be absolutely controlled by the will of any existing generation: it is a result of antecedents and of circumstances over which a present generation has no control. A present generation can however by its intellectual activity and its moral character materially affect the form of Government, and transmit to another generation new antecedents and new circumstances, which may either be favourable or unfavourable to the happiness of succeeding generations.

What is the best form of Government? a question which has been gravely put and seriously answered, is an absurdity. There is no best form; unless we admit that the form of Government is an undoubted exponent of the results of Government, and we know by experience that it is not. But this is no reason why each generation in a state should not labour to improve that Government which exists, and to give it whatever form may be best adapted to secure the freedom of each individual. Happiness of the individuals is not the end of Government, for Government, as such, is not concerned about the happiness of individuals; that is a matter which concerns individuals only. The end of Government is the utmost amount of individual freedom that is compatible with the freedom of all; and this includes happiness indirectly, but not directly. That is the best Government, then, which most secures the free development of individual activity; but experience has not yet shown what that form is. In the present condition of European society, and of those foreign states whose inhabitants are of European origin, it seems that the element of a representative system is now necessary, in order that public administration may be in harmony with public opinion.

GOWER, JOHN, an early English writer, was born in the first half of the fourteenth century. Whether he was older or younger than Chaucer is doubtful; certain it is that they were friends, probably from their college days. Gower studied the law; and it has been said that he was for some time chief justice of the Common Pleas; but the assertion wants proof. He was attached to the Duke of Gloucester, uncle of Richard II., and, like Chaucer, took part in censuring the vices of the ecclesiastics of the time. It is supposed that late in life some coolness arose between Gower and Chaucer; but the idea rests on too slight a foundation to be accepted as true.

Gower's works are:—1, 'Speculum Meditantis,' a collection in French verse of precepts and examples of chastity; 2, 'Vox Clamantis, a Latin poem, in seven books, on the insurrection of the Commons under Richard II.; 3, 'Confessio Amantis,' which is written for the most part in English octave verse, with interspersed Latin elegiacs and Latin prose tables of contents. This poem shows a desire on Gower's part to conform to the taste for English poetry which Chaucer had awakened among his countrymen. To compare the two men as poets, as is so often done, is absurd. Chaucer is one of the very greatest of poets; Gower is, in truth, no poet at all, but rather a moral philosopher writing in the forms of poetry and fiction. Had Chaucer not lived, Gower would have probably been only known as a composer of Norman couplets and Latin elegiacs. Gower became blind in his later years. He died

in 1402, and was buried in St. Saviour's, Southwark, to which church he was a benefactor, and where a very beautiful monument was erected to him, and now remains in fine preservation.

GOYAZ (misprinted *Govaz.*) [Brazil.]

GOYEN, JAN VAN, a celebrated Dutch painter, born at Leyden in 1596. He studied under several masters, and lastly under E. Vandervelde, and is distinguished for busy canal and river scenes, and occasionally sea pieces; some of his figures were painted by Jan Steen. He died at the Hague, in 1656. There are a few etchings by him.

GOZO, Island. [Malta.]

GOZZI, COUNT GASPARO, a writer of some distinction in the Italian literature of the 18th century, was born at Venice, December 4, 1715. He was educated in a college at Murano, but devoted his attention chiefly to the belles lettres, and, being of indolent habits and easy temper, suffered his patrimony to go to wreck, and was compelled to trust entirely to his pen for support. He married a lady who was his senior by ten years, and of an unamiable disposition. To pecuniary difficulties were thus added domestic differences. She was, however, a woman of talent, and besides many original dramas and translations, displayed some proficiency in painting; and when she died, leaving a large family, he sincerely regretted her loss. She had undertaken the management of the theatre Sant' Angelo at Venice; which so increased the difficulties Gozzi had to contend with, that he was compelled to translate for the booksellers for a subsistence. At the age of 60, on the suppression of the order of Jesuits, in 1774, he was appointed prefect of the new public schools; and afterwards received a commission to re-establish the University of Padua, in which city he died, in comparative affluence, December 25, 1786.

Among his original works, which were first published in a collected form by the Abbate Dalmistro, 1818, in sixteen volumes, the most popular are his 'Sermoni' and the 'Osservatore Veneto,' a series of periodical papers, which have obtained for their author the title of the 'Italian Addison.'

GOZZI, COUNT CARLO, brother to the preceding, was born in March 1722. At a very early age his love of reading and literature subjected him to fits of syncope, and at four different times he was supposed to be dead. Before he was 16 he produced four poems of considerable length, independent of smaller pieces, and a translation of Marivaux's 'Pharsamon.' To escape from the family embarrassments, he accompanied the Proveditor Querini to Dalmatia, where he studied mathematics and fortification. On his return to Venice, after some strenuous but unsuccessful efforts to recover the family estates, he wrote, in 1761, his first dramatic piece, the 'Three Oranges,' for the Sacchi company, whose theatre had been almost deserted in favour of Goldoni's. It was very successful; and he followed it up with other dramas, all founded upon Eastern stories of wonderful adventures and enchantment, and in which Gozzi preserved the Maschere, while Goldoni strove to banish them. [Goldoni.] Their merit and popularity was so great that Schiller translated one of them, the 'Turandotte.' He wrote numerous other dramas, a humorous poem, and an autobiography, which he left unfinished. He died April 6, 1806.

GO'ZZOLI, BENOZZO, a celebrated old Italian painter, born at Florence in 1400, according to Vasari, but 1406, according to Ciampi. He was the pupil of Fra Giovanni da Fiesole, whose works, as well as those of Masaccio, he studiously imitated, but he failed in completely attaining Masaccio's style of design. Many of Benozzo's frescoes still exist in a tolerable state of preservation. Those in the Campo Santo at Pisa are considered the best. Gozzoli probably died in 1485.

GRAAF REYNET. [Cape of Good Hope.]

GRABE, JOHN ERNEST, was born at Königsberg, July 10, 1666, and was educated at the university. He afterwards came to England, where he was well received by William III., who settled a pension upon him. He took orders in the Church of England, and was made D.D. by the University of Oxford, April 26, 1706. He died in London, November 13, 1711, in his 45th year, and was interred in Westminster Abbey.

Dr. Grabe published many works, of which the most celebrated is his edition of the Septuagint, printed at Oxford in 4 vols. fol. and 8 vols. 8vo., 1707–1720. The text of this edition was founded upon the Alexandrine MS. now in the British Museum. He only lived to superintend the publication of the first and fourth volumes; the second and third, published after his death, were edited respectively by Dr. Lee and Mr. Wigan.

GRACCHUS, TIBERIUS, born B.C. 163, was the son of Tiberius Sempronius Gracchus, who was twice consul, and of Cornelia, daughter of Scipio Africanus.

T. Gracchus the elder died while his sons were young; but Cornelia devoted herself to the education of her children with the most tender anxiety.

Tiberius served his first campaign in Africa under his uncle Scipio, and afterwards as quæstor under Mancinus in the Numantine War. His name, which the Numantines respected from remembering his father's virtues, is said to have procured the terms under which Mancinus obtained safety for his army; but the senate was so much displeased at the unfavourable nature of the terms, that they resolved on giving up all the principal officers to the Numantines. It was however ultimately decided to send Mancinus as the real criminal, and to spare the other officers for the sake of Gracchus. This treatment roused Gracchus against the senate, and made him the friend of the poor, and three years afterwards he began his short career as a political agitator. He was elected tribune of the Plebs, B.C. 133.

The long wars in which the Romans had been engaged led to the introduction of an enormous number of slaves into Italy, who tilled the large estates of the rich to the exclusion of the regular labourers; and Italy presented the scene of a country whose only cultivators were foreign slaves.

These causes, acting on a disposition at once ambitious and humane, and aided by the suggestions of his mother, and by the general voice of the people expressed in placards and memorials

addressed to him as to their preserver and champion, combined in inducing Tiberius Gracchus to attempt the revival of the Licinian Rogations. [AGRARIAN LAW.] He appears to have had in view the employment of freemen in preference to slaves, and the equitable division of the public land. Three commissioners were to be appointed to superintend the working of the new law which Gracchus proposed. Crowds arrived from all parts of the country to support either side; and there appeared no doubt which way the matter would go when left to the tribes. The aristocracy, by securing the veto of M. Octavius, one of the tribunes, quashed the proceedings whenever the law was brought on; which violent mode of opposition led Gracchus to exercise his veto on other questions, and throw the government into complete helplessness.

Thus far the contest had been lawful, but at this juncture Gracchus, by a vote of the tribes, ejected Octavius from the tribuneship. The Agrarian law was passed, and Gracchus himself, his brother Caius, and his father-in-law Appius Claudius, were appointed the commissioners. While things were in this state, Attalus, king of Pergamus, bequeathed his kingdom and property to the Roman people; and Gracchus proposed to divide the treasure among the recipients of land under the new law, to enable them to stock their farms.

This brought matters to a greater pitch of distrust than ever. Gracchus was accused by one senator of aspiring to tyranny, and by another of having violated the sanctity of the tribune's office in deposing Octavius. At this juncture Gracchus seems to have trembled for that popularity which alone preserved him from impeachment, and, lest it should fail, endeavoured to secure his own re-election to the office of tribune. The other party had demurred as to his eligibility to the office two years in succession, and on the day of election this point occupied the assembly till night-fall. Next morning, accompanied by a crowd of partisans, he went to the capitol, and, on hearing that the senate had determined to oppose him by force, armed his followers with staves. At this juncture, Scipio Nasica, having in vain called on the consul to take measures for the safety of the state, issued from the Temple of Faith, where the senate had assembled, followed by the whole nobility of Rome, put the mob to flight, seized their weapons, and attacked all who fell in their way. About 300 fell, and among the slain was Gracchus, B.C. 133.

GRACCHUS, CAIUS, was nine years younger than Tiberius, and at his death was left with Appius Claudius as commissioner for carrying out the Agrarian law; but Caius refrained from taking any part in public affairs for more than ten years after that event.

During this time the provisions of his brother's law were being carried out by Carbo and Flaccus, but he does not seem to have begun his career as an independent political leader until the year 123 B.C., when, on his return from Sardinia, where he had been for two years, he was elected tribune of the Plebs. He now proposed various measures, one of which was a poor-law, by which a monthly distribution of corn was made to the people at an almost nominal price.

Gracchus now possessed unlimited power with the populace, and at the end of the year he was again chosen. His second tribuneship was mostly employed in passing laws respecting colonies, in which matter the aristocratical agent, Livius Drusus, outbid him, and, having won the confidence of the people by his apparent disinterestedness, ventured (being himself a tribune) to interpose his veto on one of Gracchus's measures. His appointment to the office of commissioner for planting a colony near Carthage took him away from Rome, and soon after his return a proposal was made to repeal the law which he had been engaged in carrying out. This law was not his own measure, but that of one Rubrius, another of the tribunes, and was one of those enactments which had weaned the favour of the people from him. He was now a private man, as his second tribuneship had expired, but as such he opposed the proposal, and united with Fulvius, one of the commissioners of the Agrarian law. His partisans collected at the capitol on the day of deliberation, and by their conduct broke up the assembly. The senate, alarmed at these proceedings, gave the consul, Opimius, full powers to maintain order. He collected soldiers and summoned Gracchus and Fulvius to answer for their conduct. After some attempt at negotiation, he attacked the popular party, and soon dispersed them. Gracchus fled, but being hard pressed he crossed the Tiber, and there, in a Grove of the Furies, commanded his servant to destroy him. He perished when about thirty-three years of age, B.C. 121.

Plutarch, Appian, and Paterculus, with what can be gleaned from Cicero and the epitomes of Livy's lost books, are nearly all the authorities for the lives of the Gracchi. See also 'Encyclopædia Metropolitana,' article by Arnold; and Plutarch's Lives of the Gracchi, in 'Civil Wars of Rome,' which consist of a selection from the 'Lives' of Plutarch, translated by Long, with notes.

GRACE. This word is frequently used in the Scriptures to denote in general the favour and love of God towards mankind, and also more particularly as manifested in the gift of his son Jesus Christ. It is also employed by theologians who believe in the depravity of human nature to designate that degree of divine influence upon the mind which enables an individual to believe in the Gospel. Grace in this sense is supposed by some theologians to be given to all men to whom the Gospel has been proclaimed: while others maintain that there are two kinds of grace, which they designate as common and special; the former consisting in such divine influences as operate beneficially upon the moral character, but leave the mind without real faith; the latter, which is necessary for salvation, being granted only to such individuals as have been elected to everlasting life. There is also great difference of opinion among theologians on what is called irresistible grace, many considering 'that grace may be resisted and rendered ineffectual by the perverse will of obstinate sinners' (Watson's 'Theolog. Dict.,' art. 'Arminius'), while

others believe 'that it is never on the whole finally rejected, so as to fail working faith in those who are the happy subjects of it.' (Doddridge's 'Lectures,' Lect. 177.)

GRACES, *Gratiæ*, in ancient mythology are represented as three young and handsome sisters, the attendants of Venus. Their names were Aglaia, Euphrósyne, and Thalía. They were originally represented as clothed, but in latter times the sculptors made them entirely naked. They were invoked to preside at the festive board, at nuptials, at births, &c. Their images were multiplied in sculptures and paintings, and votive inscriptions were affixed to them. Groups of the three Graces have been found, forming one of the most pleasing representations of ancient art; and modern sculptors, Canova among the rest, have rivalled the ancients in reproducing the same subject. (Millin, *Galérie Mythologique.*)

GRACEY. [CHER.]

GRACIO'SA, one of the AZORES, is about 20 miles in circumference: its population amounts to about 9000. It produces wine, maize, wheat, and fruits in abundance. At its north-western extremity is a small town, Santa Cruz, which has an open and dangerous roadstead; and accordingly that portion of the produce which is not consumed in the island is carried in boats to St. Michael's, whence it is exported. Wine to the value of 3000*l.*, brandy 1000*l.*, and other produce 200*l.*, were exported in 1840. There is no wood on this island.

GRADIENT. [RAILWAY.]

GRADUATE. [ARTS, DEGREES IN.]

GRADUATION is the name commonly applied to the art of dividing mathematical and astronomical instruments.

Graduation, or, as the workmen more generally style it, *dividing*, is performed in two ways, by making a *copy* of a system of divisions already existing, or by *original* dividing. The straight scales and rules which are in common use are divided thus:—The original pattern, and the scale on which the copy is to be laid, are placed side by side; a straight edge, with a shoulder at right angles, like a carpenter's square, is made to slide along the original, stopping at each division, when a corresponding stroke is cut by the dividing knife on the copy. With care and practice, this method admits of considerable accuracy. By making the straight edge turn on the centre of a divided circle, the divisions of that circle may be copied upon any concentric circle. Common protractors are thus divided, and scales upon circular limbs. The original circle, which may have several orders of divisions for different purposes, is called a *dividing plate.*

Small theodolites and ordinary circular instruments must have been thus divided, previous to the invention by Ramsden of his *dividing engine.* The errors were of course large, and Mayer proposed to get rid of them by his principle of *repetition;* but Ramsden's discovery of a machine for rapid and accurate dividing was better adapted to ordinary purposes. The general principle of Ramsden's dividing machines may perhaps be understood by the following description:—A horizontal circle of four feet diameter turns upon a vertical axis; the outer edge is ratched, or notched, by an endless screw, one revolution of which carries the circle round 10′; the pressure of the foot upon a treadle turns the screw forward, and there is a series of very ingenious contrivances which enable the divider to turn the screw through any portion of its revolution at each descent of the treadle, and which restore the position of the parts, when the foot is taken off, without allowing any return motion to the screw. The circle to be divided is fixed upon the dividing engine, and made concentric with it, and a division cut after each pressure of the foot. The Board of Longitude gave Ramsden a reward of 300*l.* for the invention of this machine, and 315*l.* for the machine itself, leaving it, during pleasure, in his possession, on condition that he would divide sextants at six shillings and octants at three, for other mathematical instrument makers. Machines of a similar kind, with some alterations and improvements have since been constructed by John Troughton, Edward Troughton, and others, and these are still employed in all instruments which are not large enough, or not sufficiently valuable, to require original dividing.

Dividing engines have been constructed somewhat differently by Reichenbach and others in Germany, and by Gambey in Paris. Much of the German division is excellent, and probably superior to any English engine-dividing. It is understood to be performed by copying. A large circle having been divided originally with great care, the copy is placed upon it, and concentric with it. A microscope is fixed independently over the divided circle, the divisions are brought in succession under the wires of the micrometer, and a line is cut in the copy after each bisection. This process is much more tedious than the English engine dividing, but it admits of the greatest accuracy when the workman is careful and expert. It is a defect in the English engine that the circle to be divided must be detached from its centre and framing, and that when reframed there is frequently a sensible eccentricity, *i.e.* the centre of the divided circle is not in the axis of rotation. This does not however cause any error if two or more opposite readings be used. It is a worse fault, that if the instrument be badly framed the circle may become distorted when the instrument is again put together. But when the divided limb is only a part of a circle, as in the sextant, any error of eccentricity is of serious importance, and this error may be very sensible after the utmost care of the artist.

It has not, we believe, been ascertained what average amount of error is to be feared in an English circle, engine-divided. We have not been able to learn a more important point, whether circles from the same engines are facsimiles. If they are, it would be easy to determine the error of one copy, and to apply correcting pieces to the stop of the dividing screw. This point is worth the attention of the artist, for, if the engine does always give the same result, the correction would neither be troublesome nor expensive; and if it does not, nor can be made so to do, the German

mode of copying must be followed where great accuracy is necessary.

For the method of original dividing, we must refer to 'Graduation,' in the *Penny Cyclopædia*.

GRÆVIUS, JOHANN GEORG, was born in 1632, at Naumburg in Saxony, and studied at Deventer, under J. F. Gronovius, whom he succeeded as professor of history and eloquence. He was afterwards appointed to fill the same situation at Utrecht, where he continued for above forty years, to the time of his death in January 1703. He edited a great number of the Latin classics. He also published 'Inscriptiones Antiquæ totius Orbis Romani in absolutissimum corpus redactæ.' But the greatest work of Grævius is his 'Thesaurus Antiquitatum Romanarum,' 12 vols. fol., Leyden, 1694–99, in which he has collected the best writers who have illustrated the institutions, the manners, and the arts of the ancient Romans. He afterwards prepared, as a sequel to it, an enormous collection under the title of 'Thesaurus Antiquitatum et Historiarum Italiæ, Neapolis, Siciliæ, Sardiniæ, Corsicæ, aliarumque Insularum adjacentium,' which was published after his death by Peter Burmann, with additions, in 45 vols. fol., Leyden, 1704–25.

GRAFTING is an operation by which a portion of one individual of the vegetable kingdom is applied to another which is within certain limits of physiological affinity, so as to form a vital union, and consequently produce a reciprocal growth. Thus a species bearing small and austere fruit may be cut down, and the remaining part grafted with a scion from a tree of which the fruit is large and delicious; and being nourished, but not changed in any essential character, this scion will form a tree, ultimately producing fruit similar in every respect, all other circumstances being the same, to that of the tree from which it was taken. The shoots of any particular variety may be cut into many hundred pieces, if sufficiently numerous, and, by grafting, each of them can be made to possess all the properties of an individual tree in the course of one season. In the case of cultivated fruits, as well as in many varieties of ornamental plants, multiplication by seeds is precarious; and with regard to *hybrids* it is impracticable, at least no assurance can be had of a reproduction of the same variety; on the contrary, a disposition is generally manifested to return to the natural wild state of the species. Grafting is in some instances the only means, and in many it is the most eligible, of preventing this. By it the peculiar richness of the fruit, or the delicate tint of the flower which we especially prefer and admire, can be perpetuated in an almost infinite series of individuals, each being the result of augmentation of the comparatively small original portion—this portion being placed in favourable circumstances for receiving an abundant supply of new and proper matter, on which it exercises its organising powers, and effects a perfect assimilation, which causes a similar development of leaves, flowers, and fruit. Propagation by cuttings, it is true, will equally continue the variety unchanged; but that process in numerous instances is slow: in others success is not attainable to any considerable extent.

The limits within which grafting may be effected extend to species and varieties of the same genus, or at all events are confined within the same natural order. Hence the statements of the ancients having successfully grafted the olive on the fig, plums on pears, and the like, are not to be credited. Scions, it may be observed, will often exist for a short time on stocks far removed from natural alliance; but such unions are never permanent, but merely subsist for a time, as they would if the ends of the scions were inserted into the moist substance of a potato.

Pears may be grafted, not only on other pears, but also on the quince (which is very frequently done), and on the medlar, white thorn, or mountain ash. Peaches are budded either on the almond, or more frequently on the plum, their own roots not being suited to the cold soil of this country. In these cases, although the leaves and fruit of the peach and the plum, the pear and the mountain ash, have a very different appearance, yet botanists have determined that the stock and the scion belong to the same natural order.

The methods of grafting are of great variety. M. Thouin ('Monographie des Greffes') has enumerated 43 modes of grafting, 39 of inarching, and 28 of budding. Many of these are however more curious than useful, and not worth being detailed. It will be better to explain the principle on which all modes of successful practice must depend, either as regards grafting, budding, or inarching.

It is well known that the bud of a plant has the power of becoming a distinct individual, if separated from the parent and placed in circumstances sufficiently favourable for its future development. But no development can take place unless the portion abstracted from any plant contain either a bud, or the perfectly formed rudiments of one. Hence the portion intended to be propagated must contain a bud or buds. The diametrical increase of exogenous plants proceeds outwardly, in consequence of the formation of new layers of alburnum, interwoven into the peculiar texture of the tree by extensions of the medullary rays. The alburnum is interposed between the inner bark and the heartwood, with both of which it is in vital or organised union. The greater part of the heartwood of a tree may be bored out, and, though made a hollow cylinder, it will still continue to increase. The outer bark may be removed, and a new one will gradually be formed; but, if the alburnum be entirely destroyed, death will be the consequence.

It appears therefore that buds with some portion of alburnum are the parts essentially necessary for propagation; for, although the heartwood and bark be organised, yet they are but passively so, and have not the power of extending organisation to new matter when they are deprived of the media of buds and alburnum. Keeping therefore the importance of the latter in view, the best mode of operation is that whereby the greatest possible extent of the alburnum of the stock and graft is brought into exact contact, without making too extensive a wound. If the sections of alburnum can be made to coincide in every point, the

result of the operation will be the most perfect that can be obtained.

The modes of grafting most generally practised are, whip, cleft, saddle, and crown grafting. Of these, *whip-grafting* is by far the commonest, and is performed as follows:—The stock is cut over, sloping, above a smooth and straight part. The end of the scion is cut sloping and thin towards the lower end. Then, on the same side of the stock as that of the lowest part of the slope made in cutting off its top, a slice is cut clean off, in length equal to that of the cut part of the scion, and in breadth so as to expose as much of the wood of the stock as will equal that seen in the slanting section of the scion. Both sections should be smooth and plain, and, as regards the alburnum, they should be the exact counterparts of each other; or, if this cannot generally be the case, the coincidence should be as exact as can be on one side at least. A thin wedge-shaped tongue is made very near the upper part of the slope in the scion, and a corresponding nick in the stock to receive it. The top part of the scion is shortened to two or at most three buds, and fitted to the stock, to which it is tied with a strip of pliable matting; and the parts so united are then covered with grafting-clay, or some other composition, which remains till the graft has pushed, or as long as there is no danger of the matting, used as a ligature, cutting or galling the parts when they begin to grow and to have an enlarged circumference. After the first loosening it is often advisable to apply slightly a fresh bandage immediately; and in some cases a little clay or composition may be put round, should the union appear too tender to endure exposure to the vicissitudes of the weather.

Cuttings intended for scions should be taken from the trees before the movement of the sap commences in spring, and put in moderately moist earth or sand, and out of the sun's rays. If the stocks be cut down at the same time, it will be so much the better; any large limbs of trees which it may be found necessary to graft should by all means be cut in before vegetation becomes active, otherwise extravasation takes place, and canker is in consequence induced.

The clay used in grafting may be made from any smooth clay, or adhesive clayey yellow loam, or brick-earth, mixed with one-third, or, according to some, one-half of cow-dung, free from litter, excepting that of hay, and, if it contain none of the latter, some fine hay must be beaten up with the mixture; the hay answers the same purpose as hair in plaster.

A compound of pitch, rosin, bees'-wax, hogs'-lard, and turpentine, has had a great reputation as a means of fixing the scion to the stock, but is not so useful as the clay.

Inarching is a species of grafting, the success of which depends on the principles above explained. It is sometimes called grafting by approach, because in performing the operation the branches or stems of two contiguously growing plants are made to approach and unite; and this union is effected on the same principles as that of whip-grafting.

GRAFTON, RICHARD, a printer in London, in the middle of the sixteenth century, under whose name are several works relating to the history of England, which are not much esteemed. Grafton's 'Chronicle' appeared in 1569, 2 vols. fol. The Chronicles of Holinshed and Stowe threw Grafton's into the shade.

GRAHAM, JOHN, VISCOUNT DUNDEE, commonly called *Claverhouse*, from the name of an estate belonging to his father Sir William Graham, of whom he was the second son. He is said to have studied at St. Andrew's, and to have made some proficiency in the mathematics; but Sir Walter Scott, who endeavoured to raise his character above that of the ordinary soldier of fortune, cannot help comparing his letters to those of a chambermaid. Like many of the younger sons of the Scottish gentry, Graham became a soldier of fortune in the continental wars, in the French, and then in the Dutch service; in the last he obtained considerable distinction. Being however refused the command of a regiment, he returned to Scotland in 1677. He obtained a captain's commission in one of the troops of horse employed in enforcing obedience to the penal laws against nonconformists in Scotland. Among many cruel agents, he made himself conspicuous by his barbarity, and obtained an unenviable renown in history, romance, and local tradition. He was defeated by the Covenanters at Drumclog, 1st June, 1769, and compelled to fly for his life. At the subsequent battle of Bothwell Bridge, his exterminating counsels were fortunately counteracted by the milder genius of Monmouth, the commander of the expedition. In 1688 he was raised to the peerage by the title of Viscount Dundee and Lord Graham of Claverhouse. While the Convention Parliament was sitting in Scotland arranging the Revolution settlement, he put himself at the head of some Highland and Irish marauders, with whom, on the 17th of June, 1689, he successfully defended the pass of Killicrankie against Mackay until he was killed by a random shot.

GRAHAM, ROBERT, the third son of Dr. Robert Graham, afterwards Moir of Leckie, was born at Stirling on the 3rd of December, 1786. He followed his father's profession, and in the early part of his life practised medicine at Glasgow. Previous to the year 1818 there was no separate chair of botany in the University of Glasgow, and lectures on this subject were read by the professor of anatomy in the summer season. On the government establishing a separate chair for botany, Dr. Graham was appointed to the post. In 1821, the chair of botany becoming vacant in the University of Edinburgh, Dr. Graham was the successful candidate for the office. He was also appointed physician to the Infirmary, and conservator of the botanic garden of Edinburgh. To the latter office he speedily devoted much attention, and to his exertions the garden is mainly indebted for its present flourishing condition.

Although Dr. Graham evidently possessed but little botanical knowledge, on his being appointed to the Glasgow chair he devoted himself with great enthusiasm to the study of it in Edinburgh,

and he probably enlisted the feelings of his pupils more by his enthusiasm than his deep knowledge. His published works consist chiefly of descriptions of new or rare plants which flowered in the botanic gardens of Edinburgh.

Although Dr. Graham was a strong and powerful man, his health gave way some years before his death, and he eventually died on the 7th of August, 1845, of an encephaloid tumour, which occupied the back part of the thorax and pressed upon the great vessels of the heart. He was a kind-hearted man, and much esteemed.

GRAHAM, JAMES. [MONTROSE.]

GRAHAM TOWN. [CAPE OF GOOD HOPE.]

GRAIN (*granum*, a seed), an old measure of weight, the smallest of those in use. It is of about the weight of a seed of wheat corn, and must therefore be considered rather as a theoretical aliquot part of a larger weight than as itself a proper standard of weight.

By a statute passed in the reign of Edward III. (A.D. 1266), it was enacted that 32 grains of wheat, taken out of the middle of the ear, and well dried, should weigh a pennyweight, of which 20 should make an ounce, of which 12 should make a pound. Consequently the pound (troy) of this period consisted of 7680 grains, whereas that afterwards in use had only 5760. The reason was, that it became usual to divide the same pennyweight into 24 instead of 32 grains. The value of the average grain of wheat is stated by Paucton at ·86 of the grain of the *poids de marc*, that is, at about seven-tenths of our modern English grain. According to Dr. Bernard's measurement, the grain of barley is $\frac{2}{3}$, or ·67 of the troy grain.

However this may be, the grain must have lost much of its importance by the introduction of the averdupois pound, of which it is not a constituent aliquot part. The ancient averdupois pound is variously stated at from 7009 grains to less than 7000, at which latter number it is now fixed by law.

The weight of one grain is obtained, for practical purposes, without difficulty, by weighing a thin plate of metal of uniform thickness, and cutting out by measurement such a proportion of the whole plate as should give one grain. But a much better plan is to draw a given weight of ductile metal into very thin wire, and to cut from the wire that length which is the same proportion of the whole length as a grain is of the whole weight. In this way pieces of wire are obtained for chemical purposes which weigh only the thousandth part of a grain; and even less weights might be obtained, if it were necessary.

GRAINGER, JAMES, was born at Dunse, in Scotland, about 1723. Having been educated for a surgeon, he served in the army in that capacity, first during the rebellion of 1745, and afterwards in Germany. Having resigned his commission, he practised for a short time in London, and then accepted a situation at St. Christopher's. On his arrival there, he married the daughter of a lady whom he had cured of small-pox during the voyage. He continued, with a short exception, to reside at St. Christopher's until his death, which took place Dec. 24, 1767.

His only claims to celebrity rest on his 'Ode to Solitude,' and his poem entitled the 'Sugar-Cane.'

GRAINS OF PARADISE are hot, acrid, aromatic seeds, obtained from the coast of Guinea, and used for medicinal and other purposes as stomachic and cordial stimulants. They are produced by the *Amomum Grana-Paradisi* of Linnæus, and *Amomum grandiflorum* of Smith.

GRALLÆ, *Wading Birds*, the fourth order of the class *Aves*, according to Linnæus, and placed by him, in his last edition of the 'Systema Naturæ,' between the orders *Anseres* (the third) and *Gallinæ* (the fifth).

Linnæus thus characterises the *Grallæ*:—Bill (a sounding staff, *Bacillus tentans*) subcylindrical. Feet wading, the thighs half naked. Body compressed, the skin very thin, sapid; the tail short. Food, consisting of animalcules, obtained in marshes. Nest most frequently made on the ground; sexual congress varying. Analogous to the *Bruta*.

The same author divides the order into two sections.

I. Feet four-toed.

Phœnicopterus, Platalea, Palamedea, Mycteria, Tantalus, Ardea, Recurvirostra, Scolopax, Tringa, Fulica, Parra, Rallus, Psophia, Cancroma.

II. Feet cursorial, *i.e.* three-toed.

Hæmatopus, Charadrius, Otis, Struthio.

In the body of the work Linnæus gives the following definition of the *Grallæ*:—Bill subcylindrical, rather obtuse. Tongue entire, fleshy. Thighs naked above the knees. [GRALLATORES.]

GRALLATO'RES (Illiger), the fourth order of Birds according to the system of Mr. Vigors, the *Rasores* being the third, and the *Natatores* the fifth.

Mr. Vigors considers the *Grallatores* as one of the aberrant groups of the class, and as exhibiting an equally circumscribed sphere of action as the *Rasores*. Holding an intermediate station between the *Gallinaceous* birds, which are restricted to the land, and the *Natatorial* groups, which are confined to the water, their typical groups appear to Mr. Vigors to be those which partake most equally of the advantages of both elements; and the aberrant groups those which discover a more predominant inclination to either. 'Of the five families,' continues Mr. Vigors, 'into which the order before us branches out, we may, in this point of view, pronounce those two to be most typical which inhabit the land, but derive their support from the water, or, to speak more correctly, which derive their whole support from the latter element, without possessing those powers of swimming or diving which are peculiar to the true water-fowl. The exclusive food of such groups will be fish, water reptiles and insects, mollusca and animalculæ; and their distinguishing external characters, length of legs and bill, the former for the purpose of wading, the latter for that of seizing their prey, or of extracting it by suction from the waters or marshes. Of the three remaining families, two, as I have observed in an early part of this inquiry, will be found to deviate from the more typical, in their food and manners being

more terrestrial, and their general appearance and structure more conformable to that of some groups of the preceding order of *Rasores:* while the third, by its capability of swimming and the rudiments of the natatorial membrane that connects the fore-toes of some of its species, equally deserts the same type, and goes off, on the other hand, to the *Natatores.* Taking these peculiarities into consideration, we may venture to view the order according to the following arrangement, placing, as usual, the more typical families in the centre:—

Gruidæ.
Ardeidæ, Leach.
Scolopacidæ.
Rallidæ, Leach.
Charadriadæ, Leach.

The following disposition distinguishes the normal and aberrant families:—

Normal Group.

Bills long, principally fitted for suction . . . } *Ardeidæ.* *Scolopacidæ.*

Aberrant Group.

Bills short, and fitted for capturing, not sucking . . } *Rallidæ.* *Charadriadæ.* *Gruidæ.*

To these families we think that the *Recurvirostridæ,* or Avocets, and the *Phœnicopteridæ,* or Flamingos, may be added. The position of the latter is doubtful; many would place them in the order *Anseres.* We set no value on the *Quinary system,* and still less on the theory of Mr. Swainson, which those who wish to study will find developed at large in his 'Classification of Birds.'

For an account of fossil Grallatores, and the impress of the feet of large species on laminated flagstones in North America (*ornithichnites*), see the 'American Journal of Science and Arts,' vol. xxix., and Dr. Buckland's 'Bridgewater Treatise,' 2nd edit.

GRAMINA'CEÆ, or GRASSES, are a very extensive and important natural order of endogenous plants, comprehending many of the most valuable pasture plants, all those which yield corn, such as wheat, barley, and maize, the sole source of sugar produced from the sugar-cane, and the most fragrant of all plants in the form of *Andropogons.* Their structure is among the most simple of the perfect forms of vegetation; a stem clothed with alternate leaves whose stalks are universally thin, and constituting as many sheaths to guard the young and rapidly growing shoots, a few rudimentary leaves collected at the ends of the branches of inflorescence, and constituting flowers, a very small number of stamens, and a single seed inclosed in a thin pericarp, are all that nature provides to enable these plants to preserve their race and to distinguish their numerous kinds from one another. Yet, with such a simple apparatus, many thousand species are so precisely characterised that the natural order of grasses is one of the easiest to recognise.

There is a great difference between the value of grasses for pasture; certain kinds suit the meadows, others marshes, others upland fields, and others bleak and sterile hills, where they furnish valuable food for sheep: these kinds will not grow indiscriminately, or are not equally suitable for different soils and situations, and it is therefore essential for the husbandman that he should be capable of discriminating between them. Some indicate the quality of soil. The species of *Dactylis, Holcus,* and *Bromus* are inhabitants of sterile land; the *Festucas* and *Alopecuri* of better soil; while various *Poas* and *Cynosurus* are found only in pasture-land of excellent quality. The single species *Lolium temulentum* is a deleterious species in the midst of harmless *Lolia,* and *Bromus purgans* and *Festuca quadridentata* afford similar instances of singular exception to ordinary rules.

The principal grasses useful to man are described in this work under their generic names.

GRAMMAR. [Language.]

GRAMMONT. [Flanders, East.]

GRAMMONT, COUNT DE, a celebrated personage of the age of Louis XIV., served in the army with great distinction, and rose to the rank of lieutenant-general, but he acquired his celebrity by his great wit and his relations with the most eminent persons of his day. He spent some time at the court of Charles II. of England. During his residence in England he engaged to marry Miss Hamilton. Forgetting or neglecting his promise, he set out to return to France; but being overtaken by two of the lady's brothers at Dover, and asked whether he had not forgotten something, 'Yes, indeed, I have forgotten to marry your sister,' answered Grammont, and immediately returned to complete his engagement. Grammont died in 1707, aged 84. His 'Mémoires,' which were published by his brother-in-law, Anthony Hamilton, are admitted to be a very clever production of that kind; they abound in wit and animation, and present a lively though sometimes a disgusting picture of the profligate court of Charles II. Of the English editions the best is that of 1811, in 2 vols., with 63 portraits, and many notes and illustrations.

GRAMPIANS. [Great Britain.]

GRAMPOUND. [Cornwall.]

GRAMPUS. [Whales.]

GRAN. [Hungary.]

GRAN-CANARIA. [Canaries.]

GRANA'DA, a province of Spain, is bounded on the E. by Murcia, on the S. by the Mediterranean, and on the N. and W. by Andalucia. Its figure approaches to that of a triangle, having its base to the east, and its apex towards Gibraltar. Its length from east to west-south-west is about 240 miles; its breadth varies from about 30 to 80 miles. The population is between 800,000 and 900,000. Its principal towns are Granada, the capital; Malaga, a port chiefly of exportation; Almeria, Almañecar, two ports of importation; Guadix, Motril, Marbella, Velez-Malaga, Baza, Vera, Ronda, Loja, Santa Fé, Antequera, and Alhama.

Granada was formed into a distinct state by the Moors of Spain in 1238, and rose to a pitch of intellectual greatness hardly equalled at the time in any other part of Europe. [Moors.]

The whole of this province is diversified with majestic mountains, delightful valleys, and wide

many meadows, which, without being irrigated, are mown every year, and only fed between hay harvest and the next spring. These require frequent manuring to keep them in heart, and with this assistance they produce great crops of hay every year. The management of this grass land is well understood in Middlesex. An acre of good grazing land, worth 40*s.* rent, is supposed to produce 200 lbs. of meat in the year. If this is worth 6*d.* a pound, the gross produce is 5*l.* per acre. The expenses will not exceed 10*s.* per acre, so that here is a net profit of 2*l.* 10*s.* per acre with little or no risk; few arable farms will average this net profit. By uniting the raising of corn and the grazing of cattle and sheep, the greatest profit is probably obtained, and this is the great argument in favour of the convertible system of husbandry.

GRASSE. [VAR.]

GRATELU'PIA, a genus of conchifers established by M. Charles Desmoulins for a fossil bivalve which had been confounded by M. de Basterot with the genus *Donax*, under the name of *Donax irregularis*. But one species, *Gratelupia donaciformis*, was known (from Bordeaux, Miocene formation of Lyell), till Mr. Lea discovered a second in the Claiborne tertiary (Eocene of Lyell), which he has named *Gratelupia Moulinsii*, after the founder of the genus. Diam. 1 inch, length 1.4, breadth 1.9. The genus was named by M. C. Desmoulins after Dr. Grateloup.

GRATIA'NUS, AUGUSTUS, eldest son of Valentinian I., succeeded after his father's death, A.D. 375, to a share of the Western Empire, having for his lot Gaul, Spain, and Britain; his brother, Valentinian II., then an infant five years old, had Italy, Illyricum, and Africa, under the guardianship however of Gratianus, who was in reality ruler of all the West. His uncle Valens had the Empire of the East. Gratianus began his reign by punishing severely various præfects and other officers who had committed acts of oppression during his father's reign. At the same time, through some insidious charges, Count Theodosius, father of Theodosius the Great, and one of the most illustrious men of his age, was beheaded at Carthage. In the year 378 Valens perished in the battle of Adrianople against the Goths, and Gratianus called to him young Theodosius, whom he sent against the Sarmatians, who had crossed the Danube to join the Goths. Theodosius defeated them completely, and drove the remainder beyond that river. Gratianus appointed Theodosius his colleague (in January 379), and gave him the provinces of the East. Gratianus returned to Italy, and resided some time at Milan, where he became intimate with Bishop Ambrose. He was obliged however soon after to hasten to Illyricum to the assistance of Theodosius, and he repelled the Goths, who were threatening Thrace. From thence he hastened to the Rhine to fight the Alemanni and other barbarians. Having returned to Milan in the year 381, he had to defend the frontiers of Italy from other tribes who were advancing on the side of Rhætia. Gratianus enacted several wise laws: by one of them he checked mendicity, which had spread to an alarming extent in Italy. He also showed himself disposed to tolerance towards the various sects of Christians, but he displayed a stern determination against the remains of the heathen worship.

In A.D. 383, a certain Maximus revolted in Britain, and was proclaimed emperor by the soldiers. He invaded Gaul, where he found numerous partisans. Gratianus was seized at Lyon, and put to death by the partisans of Maximus. His remains were transferred to Milan, where they were interred. He was little more than twenty-four years of age, and had reigned about eight years. Ammianus Marcellinus, who is not liable to the charge of partiality towards the Christians, adds that, had he lived longer, he would have rivalled the best emperors of ancient Rome.

GRATIA'NUS, a Benedictine monk of the 12th century, a native of Tuscany, according to some, and resident at Bologna. He is chiefly known for his 'Collection of the Canons, or Decretals, of the Church,' which occupied him during twenty-four years, and which he published at Rome about the middle of the 12th century. The collection, which has become known by the name of 'Decretum Gratiani,' was first printed at Mainz, in folio, 1472, and forms part of the 'Corpus Juris Canonici.' [CANON LAW.] Gratianus ranged the decisions and canons in order, and distributed them under distinct heads, endeavouring to explain the obscurities and reconcile the contradictions which appeared in some of them. But he retained at the same time, through want of authentic authorities and of enlightened criticism, many apocryphal canons, and many erroneous textual readings: he appears indeed to have felt his own deficiences, for he honestly cautions his readers not to place implicit faith in his writings, but to scan them by the light of reason and by the test of moral evidence. ('Decret. Distinctio,' ix., ch. 3–5.)

The grosser errors and the apocrypha of the 'Decretum' were corrected and expurgated in an improved edition executed by order of Gregory XIII., 1582; but still many assertions favourable to the absolute supremacy as well as to the temporal authority of the popes were allowed to remain in it, as being sanctioned by ages, though contrary to the ancient discipline of the church. These are what are styled in France and other countries north of the Alps the ultramontane doctrines of the Roman Curia. Antonius Augustinus has written a treatise, 'De Emendatione Gratiani,' which forms a useful supplement to the 'Decretum.'

GRATTAN, HENRY, was born in Dublin in the year 1750. His father, a barrister and a Protestant, was recorder of Dublin, and also its representative in the Irish parliament. Young Grattan entered at the usual age, as a fellow-commoner, at Trinity College, Dublin; and, having here distinguished himself considerably, he proceeded to London, after taking his degree, for the purpose of keeping terms at the Middle Temple, and of studying law. He was called to the Irish bar in 1772. In 1775 he was returned to the Irish parliament, under Lord Charlemont's auspices, as representative of the borough of Charlemont.

In parliament he at once joined the ranks of opposition. One of the first great fruits of Grattan's zeal and eloquence was the partial throwing open of Irish commerce. Subsequently, in 1780, he obtained from the Irish parliament the memorable resolution 'that the King's most excellent Majesty and the Lords and Commons of Ireland are the only power competent to make laws to bind Ireland.'

Such was the pitch of popularity to which Grattan had now attained, that the Irish parliament voted him the sum of 50,000*l.* 'as a testimony of the national gratitude for great national services.' In consequence of the declaration of rights of the Irish parliament, a negotiation was set on foot for the repeal of the act (6th of George I.) by which the British legislature declared its right to bind Ireland by British statutes. When the repeal of this act was brought forward in England, Mr. Flood moved in the Irish parliament for leave to bring in a bill for declaring the exclusive right of the Irish parliament to make laws for Ireland. Grattan contended that the simple repeal of the act was sufficient. Mr. Flood's bill was thrown out by a large majority of the House; but the sympathies of the nation were with Mr. Flood. A belief now gained ground, and was much encouraged by Mr. Flood's acrimonious attacks, that, having received his reward, Grattan had ceased to be a patriot; and he now for a time undeservedly lost much of his well-earned popularity.

His opposition however, in 1785, to the propositions regarding the trade between Great Britain and Ireland, moved by Mr. Orde, in the Irish parliament, and ever since well known as Orde's Propositions, restored him to his lost place in the affections of his countrymen. One of these propositions was to the effect that the Irish parliament should from time to time adopt and enact all such acts of the British parliament as should relate to the regulation or management of her commerce. Owing principally to Grattan's efforts, the measure was relinquished. And he went on to secure a continuance of his now regained popularity by the introduction of a measure for getting rid of tithes, which was however rejected. Occupying moreover the leading place in the Whig Club which then existed in Dublin, Grattan succeeded in obtaining a public declaration from its members that they would never accept office under any administration which would not concede certain measures tending to increase purity of election and ministerial responsibility. In 1790 Grattan was returned to parliament for Dublin.

In the parliament which now met, the question of Catholic Emancipation being raised, Grattan appeared of course as the friend of religious liberty. He thereby offended his new constituents. At the same time he found himself unable to stem that movement which, originating with the recall of Lord Fitzwilliam, terminated in the rebellion of 1798; and he therefore voluntarily retired from parliament. He was afterwards returned for Wicklow, for the express purpose of opposing the Union. The Union was carried, and in 1805 he entered the Imperial parliament as member for the borough of Malton. The next year he was returned for Dublin. Preserving in his new position the reputation which he had before acquired for eloquence, he also adhered inflexibly to those principles of toleration and popular government of which in Ireland he had been the champion. He lost no opportunity of advocating the Catholic claims. He may be said indeed to have died in the cause of Catholic Emancipation. He had undertaken to present a petition from the Irish Catholics, and to support it in parliament, notwithstanding the remonstrances of his friends that the exertion would be incompatible with his declining health. 'I should be happy,' he replied to those remonstrances, 'to die in the discharge of my duty.' He had scarcely arrived in London with the petition, when his debility greatly increased. He died on the 14th of May, 1820, at the age of seventy. His remains were interred in Westminster Abbey. As in public life he was honest and consistent, so was he in his private irreproachable. His speeches were collected and published by his son, in four volumes 8vo., in 1821. There is also a volume of his miscellaneous works.

GRÄTZ. [STYRIA.]

GRAUBÜNDTEN. [GRISONS.]

GRAUDENZ. [MARIENWERDER.]

GRAUN, CARL HEINRICH, was born in Saxony in 1701. He was a scientific singer; but it is as a composer of church music that he is best known. He was much patronised by Frederick the Great, and died in 1759. Graun was a very voluminous composer, but most of his works are now forgotten. His short oratorio, 'Der Tod Jesu' (The Death of Christ), possesses very considerable merit; but his name will be transmitted to posterity by his 'Te Deum,' a work of invention, beauty, and grandeur.

GRAUWACKE, a German term applied to some of the ancient stratified rocks. They may be considered as having almost the same relation to clay slates that argillaceous sandstones and conglomerates bear to common clays; for argillaceous slate, by including rolled fragments or minute grains of quartz-sand, with or without mica, becomes the grauwacke and grauwacke slate. British geologists do not uniformly use this designation; but the rocks, by whatever name called, lie in the midst of the primary argillaceous strata. [GEOLOGY.]

GRAVEL, the small fragments of rocks which have been drifted by any force of water over the surface of the earth. Whether the gravel observed at any spot was transported along the natural drainage hollows of the surface may be often certainly known by inspection of the nature of the fragments and the examination of the physical geography of the country in which they occur. Whether the waters descending these valleys performed the effects while flowing at higher levels, under the influence of dams, lakes, or other peculiarities, may also often be determined by suitable examination. The study of gravel-deposits thus becomes an interesting feature in connection with the past history of the earth's surface.

lieutenant-general in 1759, and sent in that year as second in command, under Lord George Sackville, of the British troops co-operating with the King of Prussia. At the battle of Minden he was complimented by Prince Ferdinand of Brunswick, at the expense of his superior officer, who was ultimately broken for his conduct on that occasion. On the resignation of Lord Geo. Sackville, the Marquis became chief in command of the British troops, and obtained distinction during the Seven Years' War. After four years of warm service, he was rewarded with the post of master of the ordnance, in May 1763, and in August 1766, was promoted to be commander-in-chief. He resigned this office in January 1770, and died much regretted on the 10th of October following, without succeeding to the dukedom.

GRAND JURY. [Jury.]

GRAND SERJEANTY, one of the ancient English tenures. Tenure by grand serjeanty is when a man holds his land or tenements of the king by such services as he ought to do in his proper person to the king, as to carry the banner of the king, or his lance, or to lead his army, or to be his marshal, or to carry his sword before him at his coronation, or to be his carver, or his butler, or to be one of his chamberlains of the receipt of his exchequer, or to do other like services, &c. (Littleton, s. 153.) The word serjeanty, *serjeantia*, is the same as service, *servitium*. Tenure by grand serjeanty still exists so far as relates to merely honorary services, but the burthensome incidents were taken away by the 12 Car. II. c. 24.

GRANDEE. *Grande de España* is the name of the highest rank in the Spanish nobility. The grandees were originally the descendants of the great feudatories of the crown, but since the time of Don Carlos I. (Charles V. of Germany), it became the practice of the Spanish kings to raise new men to the rank of grandees, which occasioned a distinction between the old and the new grandees, marked by the old ones addressing each other in the second person singular, 'thou;' whilst those of a recent creation were addressed by the title of 'your excellency,' which belongs to all Spanish grandees. The collective body of the grandees is called La Grandeza, but they have no peculiar political privileges under the present constitution of Spain.

GRANGE, LA. [Lagrange.]

GRANGER, REV. JAMES. Little is known of the personal history of Granger. He studied at Christ Church, Oxford, and was presented to the vicarage of Shiplake, in Oxfordshire, where, according to the dedication of the work which brought him into notice, he had 'the good fortune to retire early to independence, obscurity, and content.' This work is entitled 'A Biographical History of England, from Egbert the Great to the Revolution; consisting of characters disposed in different classes, and adapted to a methodical Catalogue of engraved British Heads; intended as an Essay towards reducing our Biography to system, and a help to the knowledge of Portraits.' The first edition appeared in 1769, in two 4to. volumes, and a fifth edition, with upwards of four hundred additional lives, appeared in 1824, in six thin royal 8vo. volumes. A continuation, which extends to the end of the reign of George I., and was compiled by the Rev. Mark Noble, partly from his own and partly from Granger's collections, appeared in 1816, in three volumes 8vo. Granger died on the 14th of April, 1776, at the age, it is supposed, of about sixty. An 8vo. volume, containing extracts from his correspondence, miscellanies, and notes of tours, edited by J. P. Malcolm, appeared in 1805.

GRANI'CUS. [Alexander III. *the Great*].

GRANITE, one of the most abundant rocks seen at or near the surface of the earth. It underlies the stratified rocks [Geology], and appears at some remote geological æra to have been in a fluid state from the effect of intense heat.

Granite is one of the most beautiful of rocks, and viewed mineralogically its composition is remarkable. Mica, felspar, and quartz, in distinct crystals, or else filling interstices between crystals, constitute the typical varieties; but other minerals, such as hornblende, actinolite, chlorite, talc, compact felspar, steatite, garnet, zircon, &c., enter into and sometimes considerably modify the aspect of granite, especially in colour, which varies much. Except in a few cases, granite, as its name implies, shows the grains of its component parts: the size of these varies extremely. Granite is indeed rather a name for a mode of aggregation than for a definite chemical or even mineralogical structure; and the varieties are thus too numerous to be distinctly named.

GRANJA, LA. [Castilla-la-Vieja.]

GRANT (Concessio), in law, a conveyance in writing of incorporeal hereditaments, or of such interests in or arising out of land whereof no livery or tradition can be made. All corporeal hereditaments, as lands and houses, of which actual delivery can be made, are said, according to the old law expression, to lie in livery; but advowsons, commons, rents, reversions, &c., which from their nature cannot so be transferred, are said to lie in grant. At common law, as at present, a writing was necessary to support a grant, the writing being the evidence of such transfer of property, as livery of seisin was in the case of a feoffment. Until the Statute 4 Ann, c. 16, sc. 9, the ceremony of attornment was necessary in such grants of interests in reversion or remainder as are grantable. [Attornment.]

The term grant is also applied to a transfer of goods and chattels, and to the contract to pay an annuity for a valuable consideration.

GRANT, ANNE, commonly called Mrs. Grant of Laggan, a miscellaneous writer, was born at Glasgow on the 21st February, 1755. Her maiden name was Macvicar, and her father, Duncan Macvicar, held a commission in the army, and served for some time in America before the Revolution. By that event he lost considerable estates, which were appropriated by the revolutionists, while he did not come within the scheme of compensation to sufferers, as he resided in Britain during the war. In 1773 he became barrack-master of Fort Augustus in Inverness-shire, and there his daughter met Mr. Grant, the clergyman of the neighbouring parish of Laggan, to

whom she was married in 1779. In 1801 she was left a widow, with a large family and in very straitened circumstances. In 1803 her friends prevailed on her to publish a volume of 'Original Poems, with some Translations from the Gaelic,' which was very successful. Since the time of her first residence in the Highlands she had studied the position and habits of the people, and in consequence published in 1806 'Letters from the Mountains,' one of the most successful of the productions of light literature in its day. She subsequently lived at Edinburgh, where she was the highly esteemed centre of a circle of accomplished and amiable people, and where, notwithstanding her own difficulties, she managed to be of great service in relieving the difficulties of others. She published 'Memoirs of an American Lady,' in 1808; and 'Essays on the Superstitions of the Highlands of Scotland,' in 1811. She died on the 7th November, 1838. Her 'Memoir and Correspondence' was published in 3 vols.

GRANTHAM. [LINCOLNSHIRE.]

GRANVILLE. [MANCHE.]

GRANULATION. [WOUND.]

GRAPE-SHOT is an assemblage, in the form of a column, of nine balls resting on a circular plate, through which passes a pin serving as an axis. The balls are contained in a strong canvass bag, and are bound together on the exterior of the latter by a cord disposed about the column in the manner of a net.

A fire of grape shot is on service frequently directed against an enemy's troops when advancing in close order to an attack.

GRAPE-VINE. [VITIS.]

GRAPES. [FRUIT.]

GRAPHITE. [PLUMBAGO.]

GRAPSUS, *Grapsus Tribe, Grapsoïdians,* a natural group of brachyurous Crustaceans which belong to the family of *Catametopes,* placed by M. Milne Edwards between the *Gonoplacians* and the family of the *Oxystomes,* and approaching, in his opinion, nearer to the tribe of *Gonoplacians* than to the *Ocypodians.* The greater numbers of the tribe, as far as the manners of the crustaceans composing it are known, live on the shore, or on the rocks which border the coasts; they are very timorous, and run away with much swiftness.

M. Milne Edwards divides the tribe into seven genera, viz.:—1. *Sesarma.*—Locality, the coasts of America, Africa, and Asia. 2. *Cyclograpsus.*—Locality, the seas of Asia exclusively. 3. *Pseudograpsus.*—Locality, the Asiatic seas. 4. *Grapsus.*—Locality, universal; on rocky coasts; run with great activity. 5. *Nautilograpsus.*—One species only known; oceanic, on masses of floating fucus, or on large marine animals. 6. *Plagusia.*—Locality, the ocean from the Cape of Good Hope to Chili, the Indian seas. 7. *Varuna.*—One species known; locality, the Indian Ocean.

GRAPTO'LEPIS, a genus of fossil ganoid fishes, from the carboniferous system of Carluke. (Agassiz.)

GRASS LAND may be divided into water-meadows, upland pastures, and artificial grasses. The first are treated of under IRRIGATION: the nature and management of the last two we shall here briefly describe. Upland pastures are portions of land on which the natural grasses grow spontaneously, varying in quantity and quality with the soil and situation. When a pasture is naturally rich, the only care required is to stock it judiciously, to move the cattle frequently from one spot to another, and to eradicate certain plants which are useless or noxious. The urine of the cattle is the manure which chiefly keeps up the fertility of grass land. A poor arid soil is not fitted for grass, nor one which is too wet from the abundance of springs and the want of outlet for the water. These defects can only be remedied by expensive improvements.

When old meadows have been neglected, or too often mown, they produce nothing but a coarse sour grass. In that case, besides draining it if required, the land must be broken up and undergo a regular course of tillage, until the whole of the old sward is destroyed. The proper method of treating such land is to take no more corn crops than will pay the expense of breaking up, carting earth, lime, or other substances upon it, to improve the soil, and to lay it down to grass again as soon as the old sward is fully destroyed.

If the soil is fit for turnips, no better crop can be sown to prepare for the grass seeds, which should be sown without a corn-crop. Turnips of an early kind may be sown in May, and fed off with sheep in August or September; and the ground being only very slightly ploughed, or rather scarified, and harrowed fine, the seeds may be sown and rolled in. The species of grasses sown must depend on the nature of the soil; but it is impossible to be too choice in the selection. The quantity per acre of the mixed seeds should not be less than 30 or 40 pounds, to insure a close pile the next year. If the soil is not naturally rich, liquid manure should be used. Sometimes, in soils not congenial, recourse is had to inoculating grass. This is done by taking pieces of sward from an old meadow, and spreading them over the surface of the land to be laid down, after it has been ploughed and prepared. This is a very effectual method of producing a permanent pasture.

When an arable field is sown with the seeds of grasses and other plants which give herbage for cattle, it is called an artificial meadow. Clover in this case is always a principal plant, both the red and the white; these, with annual or perennial rye grass, are sown with a crop of corn in spring, and begin to show themselves before harvest. The seeds usually sown on an acre, when the land is laid down to grass, are as follows:—Red clover, 12 lbs.; white, 6 lbs.; trefoil, 4 lbs.; rib grass, 2 lbs.; and 2 pecks of Pacey's rye grass. Sometimes cockfoot grass (*Dactylis glomerata*) and cow grass (*Trifolium medium*) are added. This is for a field intended to remain four or five years in grass.

The introduction of artificial meadows in districts where the soil seemed not well adapted for pasture has greatly increased the number of cattle and sheep reared and fattened, and has caused greater attention to be paid to the means of improving the breeds of both.

In the neighbourhood of large towns there are

plains it has also an extensive line of coast. The Sierras de Nevada, Alpujarras, Gador, Bermeja, and Ronda, are among the mountains of the province. Mulhacen, one of the summits of the Sierra de Nevada, is 13,572 feet high. The Jenil, Guadix, Guadiaro, Guadelmedina, Motril, and Almeria are the principal streams. The mineral springs are numerous. The soil is covered with a luxuriant vegetation. The sumac and the cork trees, the oak bearing the edible fruit, and many other valuable trees and shrubs, form the extensive thickets of the Sierras. The soil is very productive and the agriculture good. Metals are abundant in the mountains. Near Cangajar alone there are 117 lead mines. Copper ore lies on the surface in many places; antimony and quicksilver are found near Malaga, and molybdenum at Ronda. Coal is found on the margins of the Beiro and of the Alfacar, near the capital. Exquisite marbles, jaspers, and alabaster, are abundant.

GRANADA, a city of Spain, capital of the province of Granada, and the seat of an archbishopric, is situated at the foot of the Sierra Nevada, in 37° 17′ N. lat., and 3° 50′ E. long.

This city was built in the 10th century by the Saracens. After the overthrow of Cordova, of which it had been the capital, Granada became in 1238 the no less celebrated capital of the new kingdom. It increased to great size, splendour, and populousness, before the decline of the Moorish power in 1492. The Alhambra, the Generalife, Torres, Bermejas, &c., are the principal but faint memorials of its Arabian grandeur. [ALHAMBRA.]

Granada stands on and between two hills. The Darro intersects the city, and the Jenil skirts it; and the river banks afford many beautiful shady walks. The aspect of the city at a distance is imposing; but this effect is removed on entering it by the intricacy, steepness, and narrowness of its streets, and by the mean appearance of the houses. In the level parts however there are spacious squares. The cathedral, though irregular, is a splendid structure, profusely ornamented, and containing beautiful statues and pictures. The other principal churches are those of San Jeronimo, the Chartreux, las Angustias, and Santa Cruz.

There is an archiepiscopal palace, an extensive general hospital, a Moorish bazaar, a university, six colleges, a mathematical academy, and other educational establishments. There is a royal manufactory for saltpetre and gunpowder, and several manufactories of silk stuffs, such as velvet, taffetas, satin, handkerchiefs, and ribands. The sewing silk of Granada is preferred to all others. These manufactures, as well as that of sail-cloth, have greatly declined during the present century.

The population, which in the time of the Moors was said to be nearly 400,000, is now about 80,000.

(Miñano: *Antiguedades Supuestas de Granada; Travels* by Swinburn, Laborde, &c.; Ford's *Hand-book of Spain.*)

GRANADA, NEW, is one of the three republics in South America, which were formed from the previous republic of Columbia in 1831, the other two being ECUADOR and VENEZUELA. On the south it borders on Ecuador; on the east on Venezuela; on the west on the Pacific; and on the north on Central America. It lies between 1° 30′ and 12° 30′ N. lat., and between 70° and 83° E. long. The area is about 470,000 square miles. The western part, which is more than half of its surface, is comprehended within the range of the Andes; the eastern belongs to the great plains, or Llanos, of the Orinoco River.

The western or mountain region of New Granada is intersected by the Andes [ANDES], which divide into separate ranges, inclosing elevated valleys. One of the peaks (Tolima), exceeds 18,000 feet in height, and several of them are above the snow-line. Some of the valleys are 7000 feet above the level of the sea. Lofty mountain-passes form the only roads over these mountains; and one of them (that of Quindiú) is 11,500 feet high.

The Rio Magdalena rises between two of the ranges, about 2° N. lat., and falls 670 feet in the first 200 miles of its course. At one point, below Badillo, it divides into two branches, which inclose an island about 20 miles long and 10 miles wide. Both branches are navigable. The river, after a course of 840 miles, flows by two mouths into the Caribbean Sea. The valleys through which the river and its tributaries flow are very fertile. The Rio Cauca is the chief of these tributaries. It rises near the sources of the Magdalena, and joins the latter river near Mompox, after a course of 660 miles. It has many rapids and cataracts, and falls 2500 feet in 120 miles.

The country between the mountains and the Pacific contains the basins of the rivers Atrato and S. Juan, and a rather narrow tract along the sea-shore, the general character of which is given under ATRATO.

The eastern portion of New Granada, belonging to the great plains of the Orinoco, is of unequal character. The northern half is a complete level, quite destitute of trees, with the exception of a few palms, which occur at great intervals all over the plain. Along the river courses are some low bushy trees. This extensive plain is quite unfit for cultivation, but innumerable herds of cattle and horses find here abundant pasture during the wet season, though they suffer much during the dry months. The southern half is somewhat hilly in some places. It is covered with immense forests, haunted by numerous wild animals: it is two or three degrees hotter than the level plain farther north, and its air is never agitated by a breeze.

The productions of New Granada include cacao, cotton, coffee, tobacco, indigo, rice, and sugar. The forests furnish Nicaragua and Brasiletto wood, fustic, and logwood. To these may be added the Cinchona, or Peruvian bark. The numerous herds which pasture on the Llanos furnish hides and tasajo, or dried meat; horses, mules, and horned cattle are exported to the West Indies.

The mineral riches of New Granada are considerable, and mostly occur on the western declivity of the three chains of the Andes. They consist of gold, silver, platinum, mercury, copper,

lead, iron, and rock-salt. The produce of gold seems to be on the increase, but has not yet attained the quantity which was got before the war of independence. Iron and coal are found in the mountains bordering on the table-land of Bogotà: some attempts have been made to work the iron-mines, and the coal is used in the smithies and for the steam-boats. Rock-salt and salt-springs occur.

The population of New Granada consists of the descendants of the Spaniards who have settled there during the three last centuries, of some native tribes, and a few negroes. The native tribes have attained very different degrees of civilisation. Those living among the Eastern Andes, and in the Magdalena Valley, are the most civilised; those living on the Pacific shores are less so. That portion of the Llanos which is destitute of trees is inhabited only by the descendants of Europeans, who take care of the herds of cattle, mules, and horses. The southern wooded portion of the Llanos is inhabited by different tribes of wandering Indians. The population is about 1,400,000, of whom about one-half are native tribes.

New Granada is divided into five departments.

1. *Istmo* comprehends the Isthmus of Panamà [PANAMA], with the province of Veragua.

2. *Cauca* extends over the whole of the western coast from the Bay of Panamà to Ecuador, and the valleys of the Atrato, S. Juan, and Upper Cauca. It is divided into four provinces —Popayan, Choco, Pasto, and Buenaventura. The principal town is Popayan, which contains 20,000 inhabitants, and many good buildings, among which are the Bishop's Palace, and the Jesuits' College. Farther north is Cali, in the vale of the Cauca, a clean and well-built town. Buenaventura consists only of a few wretched huts built on posts. Cartago, also in the valley of Cauca, has about 3000 inhabitants. On the shores of the Pacific are the small harbours of Atacames and Barbacoas. In the Andes, near the boundary of Ecuador, is the town of Pasto, 8576 feet above the sea, and containing 5000 inhabitants.

3. *Cundinamarca* contains the valley of the Lower Cauca, that of the Upper and Middle Magdalena, the table-land of Bogotà, and a small portion of the Llanos. It is divided into the provinces of Bogotà, Antioquia, Mariquito, and Neyva. The capital of the department and of the whole republic is Bogotà. [BOGOTA.] The celebrated natural bridges of Icononzo are in this department. They unite two rocks, between which a torrent roars. The uppermost consists of a rock 47 feet long and 6½ feet thick, and is more than 300 feet above the surface of the water; the lower bridge is nearly 70 feet under the first, and consists of three pieces of rock, which support one another. In the valley of the Rio Magdalena is Honda, with 5000 inhabitants, on the banks of the river; and farther north, at some distance from it, Rio Negro, with a population of 6000. West of Honda is Mariquita, a small town, near which are rich mines of gold. South of Honda is Neyva, with 4000 inhabitants; and still farther, near the source of the Magdalena, Timana, with 2000 inhabitants. In the valley of Cauca are Antioquia, with 4000 inhabitants; and Medellin, in a fine valley, containing 9000 inhabitants.

4. *Boyaca* comprehends the northern table-lands of Tunja, Girona, and Cucuta, and nearly the whole of that part of the Llanos which belongs to New Granada. It is divided into four provinces —Tunja, Socorro, Pamplona, and Casanare. The towns are Tunja, with 7000 inhabitants, and some manufactures of woollen and cotton stuffs; Sorocco, with 12,000 inhabitants, and manufactures of cotton and straw hats; Rosario de Cucuta, an active commercial town; and Pamplona, with 4000 inhabitants.

5. *Magdalena* comprehends the whole country east of the Gulf of Darien, and extending east to the boundary of Venezuela, not far from the Lake of Maracaybo. It is divided into the four provinces of Cartagena, Mompox, S. Marta, and Rio de la Hacha. The capital is Cartagena. [CARTAGENA.] The other towns are Mompox, a commercial town with 10,000 inhabitants; Ocaña, with 8000; Ciudad de la Hacha, with 3000, and a small harbour; and S. Marta, also with 3000, and a small harbour.

The manufacturing industry of New Granada is not important. It is limited to woollen and cotton stuffs of a coarse texture, only adapted for the use of the lower classes, and mostly made by the consumers.

The commerce of New Granada is limited by many obstructions, such as the intestine troubles of the last 30 years, the existence of steep mountains between the interior and the sea, and the general absence of good roads. The imports in 1844 were to the value of about 900,000*l.*; the exports, 600,000*l.* The trade with England forms three-fifths of the whole. Eighty-six vessels entered the port of Cartagena in that year.

New Granada was discovered by Alonso de Ojeda in 1499. The first settlement was made at S. Maria la Antigua, on the Gulf of Darien, in 1510. The Spaniards continued in possession of this country till 1811, when New Granada proclaimed its independence. [COLOMBIA; ECUADOR.]

(Juan and Antonio de Ulloa; Humboldt; *Travels* by Mollien, Hamilton, and others.)

GRANADILLA, the name applied in Brazil to the fruit of the *Passiflora quadrangularis*, which is sometimes as large as a child's head, and contains in the centre of a thick fleshy rind a large quantity of seeds surrounded by a subacid pulpy mucilage. It is much esteemed in tropical countries as a pleasant dessert-fruit, and is occasionally seen at the tables of wealthy persons in this country.

GRANA'TEÆ, a natural order of plants separated by David Don from *Myrtaceæ*, and containing only the species of the genus *Punica*.

GRANBY.—JOHN MANNERS, commonly called *Marquis of Granby*, eldest son of John, third Duke of Rutland was born January 2, 1720-21. Having entered the army, he raised a regiment of foot at his own expense in the rebellion of 1745; was appointed Colonel of the Horse Guards (Blues) in 1758; raised to the rank of

GRAVELINES. [Nord.]

GRAVELOT, HUBERT FRANÇOIS D'ANVILLE, designer and engraver, was born at Paris in 1699. He was the brother of D'Anville, the eminent geographer. When about 30 years of age, Gravelot commenced the study of painting under Restout, but he eventually adopted designing, and established himself in London as a designer and etcher about the year 1732, and found considerable employment: he returned however to Paris in 1745, and obtained considerable reputation there, chiefly as a designer. His principal works are—the drawings for the monuments of kings for Vertue; many of the etchings to Sir Thomas Hanmer's edition of Shakspere, after his own and Hayman's designs; also those for Theobald's 'Shakspere' from his own designs; a large print of Kirkstall Abbey, and many ornamental designs, executed in England. In Paris he designed the illustrations for Luneau de Boisjermain's Racine; for the great edition of the works of Voltaire by Pancoucke, and for editions, of the 'Contes Moraux' of Marmontel, and of the works of Boccaccio and of Ariosto. He died in 1773.

GRAVER. [Engraving.]

GRAVES, RICHARD, was born at Mickleton, in Gloucestershire, in 1715, received his academical education at Pembroke College, Oxford, and in 1736 was elected fellow of All Souls. Having taken orders and married, he obtained, about 1750, the rectory of Claverton, near Bath, in Somersetshire, where the remainder of his long life was spent. He engaged in private tuition with credit and success, and still found time to devote to polite literature. The only work by which he is now remembered is the 'Spiritual Quixote,' 1772, a satirical novel directed against the Methodists. He died at Claverton, November 23, 1804, nearly 90 years old.

GRAVESANDE. [S'Gravesande.]

GRAVESEND. [Kent.]

GRAVINA. [Bari, Terra di.]

GRAVINA, GIOVANNI VINCENZIO, born at Ruggiano in Calabria in 1664, studied at Naples, where he devoted himself chiefly to jurisprudence, ancient and modern. He afterwards went to Rome, where he and Crescimbeni were the founders of the Accademia degli Arcadi. In 1698 Innocent XII. appointed him professor of civil and canon law in the University of Rome. Gravina gave up his chair in 1714, and visited Calabria, but after two years he returned to Rome. Victorius Amadeus, king of Sardinia, having offered him the chair of law in the University of Turin, together with the prefectship of that institution, Gravina was preparing to remove thither, but he died in January 1718. The principal work of Gravina is the 'Originum Juris Civilis libri tres.' The best edition is that of Leipzig, 2 vols. 4to., 1737. It has been translated into French under the title of 'Esprit des Lois Romaines,' Paris, 1766. This work had a high reputation at the time when it appeared, but it has been superseded by the more profound and more critical writers of the German school of law.

GRAVITATION. The term *gravitation* was originally employed to signify the power by which bodies descend to the earth, evidenced in their weight. As applied to *terrestrial* bodies, the word was fully in use before the time of Newton, who discovered *universal* gravitation, that is, showed that the same law by which bodies at the earth's surface descend preserves the planets in their orbits, and regulates their motions. The omission of the adjective frequently causes readers to imagine that the idea of gravitation belongs to the author of the theory of *gravitation*. But the recognised phrase was theory of *universal* gravitation, and a true description of Newton's part in it requires an emphasis on the adjective. The phrase 'theory of gravitation' has become the technical term for the theory of the planetary motions, with reference to gravitation as its law.

The principle upon which the motions of the earth, moon, and planets are calculated is this: every particle of matter attracts every other particle; that is, if there were a single body alone, and at rest, then, if a second body were brought near it, the first body would immediately begin to move towards the second body. Just in the same manner, if a needle is at rest on a table, and if a magnet is brought near it, the needle immediately begins to move towards the magnet, and we say that the magnet attracts the needle. But magnetic attraction belongs only to certain bodies; whereas the attraction of which we speak here belongs to all bodies of every kind: metals, earths, fluids, and even the air and gases are equally subject to its influence.

The most remarkable experiments which prove that bodies attract each other are a set of experiments made at the end of the last century by Mr. Cavendish. Small leaden balls were supported on the ends of a rod which was suspended at the middle by a slender wire; and, when large leaden balls were brought near to them, it was found that the wire was immediately twisted by the motion of the balls. But the results of this experiment are striking principally because they are unusual; the ordinary force of gravity serves quite as well to prove the existence of some such power. For when we consider that the earth is round, and that, on all parts of it, bodies, as soon as they are at liberty, fall in directions perpendicular to its surface (and therefore fall in opposite directions at the places which are diametrically opposite), we are compelled to allow that there is a force such as we call attraction, either directed to the centre of the earth, or produced by a great number of small forces, directed to all the different particles composing the earth. The peculiar value of Cavendish's experiment consists in showing that there is a small force directed to every different particle of the earth.

But it is necessary to state distinctly the rules by which this attraction is regulated, and by which it may be calculated; or (as it is technically called) 'the law of gravitation.' Before we can do this, we must determine which of the effects of attraction we choose to take as its measure. For there are two distinct effects: one is the pressure which it produces upon any obstacle that keeps the body at rest; the other is the space through which it draws the body in a certain time, if the obstacle

is removed and the body set at liberty. Thus, to take the ordinary force of gravity as an instance: we might measure it by the pressure which is produced on the hand by a lump of lead held in the hand; or we might measure it by the number of inches through which the lump of lead would fall in a second of time after the hand is opened (as the pressure and fall are both occasioned by gravity). But there is this difference between the two measures: if we adopted the first, since a large lump of lead weighs more than a small one, we should find a different measure by the use of every different piece of lead; whereas, if we adopt the second, since it is well established by careful and accurate experiments that large and small lumps of lead, stones, and even feathers, fall through the same number of inches in a second of time (when the resistance of the air, &c., is removed), we shall get the same measure for gravity, whatever body we suppose subject to its influence. The consistence and simplicity of the measure thus obtained incline us to adopt it in every other case; and thus we shall say, 'Attraction is measured by the space through which it draws a body in one second of time after the body is set at liberty.'

Whenever we speak, therefore, of calculating attraction, it must be understood to mean calculating the number of inches, or feet, through which the attraction draws a body in one second of time.

Now the first rule is this: 'The attraction of one body upon another body does not depend on the mass of the body which is attracted, but is the same whatever be the mass of the body so attracted, if the distances are the same.'

Thus Jupiter attracts the sun, and Jupiter attracts the earth also; but, though the sun's mass is three hundred thousand times as great as the earth's, yet the attraction of Jupiter on the sun is exactly equal to his attraction on the earth, when the sun and the earth are equally distant from Jupiter. In other words (the attraction being measured in conformity with the definition above), when the sun and the earth are at equal distances from Jupiter, the attraction of Jupiter draws the sun through as many inches, or parts of an inch, in one second of time as it draws the earth in the same time.

The second rule is this: 'Attraction is proportional to the mass of the body which attracts, if the distances of different attracting bodies be the same.'

Thus, suppose that the sun and Jupiter are at equal distances from Saturn; the sun is about a thousand times as big as Jupiter; then, whatever be the number of inches through which Jupiter draws Saturn in one second of time, the sun draws Saturn in the same time through a thousand times that number of inches.

The third rule is this: 'If the same attracting body act upon several bodies at different distances, the attractions are inversely proportional to the square of the distances from the attracting body.'

Thus the earth attracts the sun, and the earth also attracts the moon; but the sun is four hundred times as far off as the moon, and therefore the earth's attraction on the sun is only $\frac{1}{160000}$th part of its attraction on the moon; or, as the earth's attraction draws the moon through about $\frac{1}{20}$th of an inch in one second of time, the earth's attraction draws the sun through $\frac{1}{3200.00}$th of an inch in one second of time. In like manner, supposing Saturn ten times as far from the sun as the earth is, the sun's attraction upon Saturn is only one hundredth part of his attraction on the earth.

The same rule holds in comparing the attractions which one body exerts upon another, when, from moving in different paths, and with different degrees of swiftness, their distance is altered. Thus Mars, in the spring of 1833, was twice as far from the earth as in the autumn of 1832; therefore, in the spring of 1833, the earth's attraction on Mars was only one-fourth of its attraction on Mars in the autumn of 1832. Jupiter is three times as near to Saturn when they are on the same side of the sun as when they are on opposite sides; therefore, Jupiter's attraction on Saturn, and Saturn's attraction on Jupiter, are nine times greater when they are on the same side of the sun than when they are on opposite sides.

The reader may ask, How is all this known to be true? The best answer is perhaps the following. We find that the force which the earth exerts upon the moon bears the same proportion to gravity on the earth's surface which it ought to bear in conformity with the rule just given. For the motions of the planets, calculations are made, which are founded upon these laws, and which will enable us to predict their places with considerable accuracy, if the laws are true, but which would be much in error if the laws were false. The accuracy of astronomical observations is carried to a degree that can scarcely be imagined; and by means of these we can every day compare the observed place of a planet with the place which was calculated beforehand, according to the law of gravitation. It is found that they agree so nearly as to leave no doubt of the truth of the law. The motion of Jupiter, for instance, is so perfectly calculated, that astronomers have computed ten years beforehand the time at which it will pass the meridian of different places, and we find the predicted time correct within half a second of time.

For further development we must refer the reader to the *Penny Cyclopædia*.

GRAVITY, CENTRE OF, is that point at which all the weight of a mass might be collected without disturbing the equilibrium of any system of which the mass forms a part. Thus, if a lever were balanced by means of two solid spheres of uniform density hung at the ends, the equilibrium would still remain if all the matter of either of the spheres could be concentrated at its centre. The centre of the sphere is then its centre of gravity.

When a body is suspended by a string, and allowed to find its position of rest, the centre of gravity is in the line of continuation of the string. If, then, a body be suspended successively at two different points, and if the lines in which the strings produced would cut through the body can be conveniently determined, the centre of gravity is the point of intersection of the two lines. This

	Arable and Gardens.	Meadows, Pastures, and Marshes.	Wastes capable of Improvement	Wastes incapable of Improvement.	Total.
England . . .	10,252,800	15,379,200	3,454,000	3,256,400	32,342,400
Wales . . .	890,570	2,226,430	530,000	1,105,000	4,752,000
Scotland . . .	2,493,950	2,771,050	5,950,000	8,523,930	19,738,930
British Islands . .	109,630	274,060	166,000	569,469	1,119,159
Acres . .	13,746,950	20,650,740	10,100,000	13,454,799	57,952,489

The ecclesiastical division of BISHOPRICS, and the judicial division of CIRCUITS, are given under those heads.

The population, area, &c. of each county are given under the name of each county; but for convenience of comparison we here give a table of the population of each county, according to the census of 1841, together with the area in square miles.

ENGLAND.

Counties.	Population in 1841.	Area. Sq. miles.
Bedfordshire . . .	107,936	463
Berkshire . . .	161,147	752
Buckinghamshire . .	155,980	738
Cambridgeshire . .	164,459	857
Cheshire . . .	395,660	1052
Cornwall . . .	341,279	1330
Cumberland . . .	178,038	1523
Derbyshire . . .	272,217	1028
Devonshire . . .	533,460	2585
Dorsetshire . . .	175,043	1006
Durham . . .	324,284	1097
Essex	344,979	1533
Gloucestershire . .	431,383	1258
Hampshire . . .	355,004	1625
Herefordshire . .	113,878	863
Hertfordshire . . .	157,207	630
Huntingdonshire . .	58,549	372
Kent	548,337	1557
Lancashire . . .	1,667,054	1766
Leicestershire . .	215,867	806
Lincolnshire . . .	362,602	2611
Middlesex . . .	1,576,636	282
Monmouthshire . .	134,355	496
Norfolk . . .	412,664	2024
Northamptonshire . .	199,228	1016
Northumberland . .	250,278	1871
Nottinghamshire . .	249,910	837
Oxfordshire . . .	161,643	756
Rutlandshire . . .	21,302	149
Shropshire . . .	239,048	1343
Somersetshire . . .	435,982	1645
Staffordshire . . .	510,504	1184
Suffolk	315,073	1515
Surrey	582,678	759
Sussex	299,753	1466
Warwickshire . .	401,715	897
Westmorland . . .	56,454	762
Wiltshire . . .	258,733	1367
Worcestershire . .	233,336	723
Yorkshire . . .	1,591,480	5836
Total . .	14,995,138	50,387

WALES.

Counties.	Population.	Area.
Anglesey . . .	50,891	271
Brecknockshire . .	55,603	745
Cardiganshire . . .	68,766	675
Caermarthenshire . .	106,326	974
Caernarvonshire . .	81,093	544
Denbighshire . . .	88,866	633
Flintshire . . .	66,919	244
Glamorganshire . .	171,188	792
Merionethshire . .	39,332	663
Montgomeryshire . .	69,219	839
Pembrokeshire . .	88,044	610
Radnorshire . . .	25,356	426
Total . .	911,603	7426

SCOTLAND.

Counties.	Population.	Area.
Aberdeenshire . .	192,387	1980
Argyleshire . . .	97,371	3956
Ayrshire . . .	164,356	1600
Banffshire . . .	49,679	647
Berwickshire . . .	34,438	476
Buteshire . . .	15,740	165
Caithness . . .	36,343	618
Clackmannanshire . .	19,155	52
Dunbartonshire . .	44,296	260
Dumfriesshire . . .	72,830	1016
Edinburghshire . .	225,454	354
Elginshire . . .	35,012	840
Fifeshire . . .	140,140	504
Forfarshire . . .	170,520	840
Haddingtonshire . .	35,886	224
Inverness-shire . .	97,799	4600
Kincardineshire . .	33,075	360
Kinross-shire . . .	8,763	70
Kirkcudbrightshire . .	41,119	882
Lanarkshire . . .	426,972	926
Linlithgowshire . .	26,872	112
Nairnshire . . .	9,217	200
Orkney and Shetland .	61,065	1320
Peeblesshire . . .	10,499	338
Perthshire . . .	137,390	2588
Renfrewshire . . .	155,072	227
Ross and Cromarty .	78,685	2424
Roxburghshire . .	46,025	227
Selkirkshire . . .	7,990	264
Stirlingshire . . .	82,057	489
Sutherlandshire . .	24,782	1903
Wigtownshire . .	39,195	459
Total . .	2,620,184	30,921

The summary of population is as follows:—

England	14,955,138
Wales	911,603
Scotland	2,620,184
	18,486,925
Islands, army abroad, navy afloat	357,309
Ireland	8,175,124
United Kingdom . .	27,019,358

The population of Great Britain, at the four preceding enumerations is given under CENSUS, where also will be found other statistical details relating to the subject.

The area, population, &c. of the colonial possessions of Great Britain are given under COLONY; and the emigration to the colonies from the United kingdom is illustrated under EMIGRATION.

History, Legislation, and Statistics.—In the volumes of the 'National Cyclopædia' there is a large body of information illustrative of the history, government, legislation, commerce, productive industry, and social relations of Great Britain. It will suffice to refer to those articles, without repeating the details here:—

The early history of the island is given under BRITANNIA, CALEDONIA, SAXONS; the later history, under ENGLAND, SCOTLAND, WALES; and especially under the names of the kings.

The government and legislation are illustrated under ARMY; CABINET; EXCHEQUER; NATIONAL DEBT; NAVY; PARLIAMENT; PEERS; PRIVY COUNCIL; STATUTES; TAXES, &c.

Local government is treated under such heads as CONSTABLE; COUNTY RATE; MUNICIPAL BOROUGHS; PARISH; POLICE; PAUPERISM and POOR LAWS; PRISONS; SHIRE.

For judicial institutions and proceedings, see ASSIZE; BANKRUPT; CHANCERY; CIRCUITS; COMMON PLEAS; CORONER; COURTS; INNS OF COURT; JURY; JUSTICE; SESSIONS; SHERIFF, &c.

Religion and Education are illustrated under BENEFICE; BISHOPRIC; CHURCH RATES; CLERGY; ECCLESIASTICAL COURTS; ESTABLISHED CHURCH; SCHOOLS; UNIVERSITIES; &c.

For commerce and trade see BANKS; CUSTOMS; EXCISE; FRIENDLY SOCIETIES; IMPORTS AND EXPORTS; INSURANCE; JOINT STOCK BANKS; RAILWAY; ROADS; SAVINGS BANKS; SHIPS; STEAM-CARRIAGE; STEAM VESSEL; &c.

For produce and manufactures, see the names of the commodities.

Language and Literature.—Under this head we propose to give such a brief account of the literature existing in each of the languages that is or has been spoken in the United Kingdom as shall present a synoptical view of the whole subject, and at the same time serve for an index to the articles in which the several writers are separately treated of.

1. The *Irish Language.*—This is generally admitted to be the purest form of the Celtic speech, which appears to have at one time been common to all the inhabitants of both islands. The Irish, as is well known, is still a spoken language. The oldest Irish manuscripts date from the 9th to the 12th centuries; but some of the bardic compositions which they contain are much older. One of the largest collections of Irish manuscripts is that in the library of Trinity College, Dublin. Of the few works that have appeared in Irish in recent times, the most remarkable are Keating's 'History of Ireland,' which was afterwards translated into English by Dermot O'Connor, and the translation of the Bible. The Irish language however has been little studied by the scholars of any other country; and most of the learned men in Ireland, as in the other countries of Europe, formerly wrote in Latin. Among the early Irish authors who wrote in Latin were chiefly Pelagius, Celestius, St. Patrick, Bishop Secundinus, Sedulius, St. Columbanus, St. Cummian, Cuminius, Adomnan, Alcuin, Dungal, Donatus, and Joannes Scotus Erigena.

2. The *Gaelic* or *Celtic of Scotland.* This is also still a spoken language. It is a sister dialect of the Irish, which it so much resembles that the Bible and a few other books in Irish were, till very recently, the only printed literature which the Highlanders of Scotland possessed. There are no Gaelic MSS. known of earlier date than the fifteenth century, and the language has a very limited literature.

3. The *Manks*, or language of the Isle of Man. This is another dialect of the Celtic. The Bible, the English Prayer-Book, and a few religious tracts are almost the only works that have been printed in the Manks.

4. The *Welsh.* The remains which we possess of the ancient Welsh literature are very considerable, both in quantity and value. They consist chiefly of the poems of the bards, of the collections of verses called Triads, of the Bruts, or Chronicles, and of some early laws. The four principal and most ancient Welsh bards are Aneurin, Taliesin, Llywarch Hen, and Merlin, who are all believed to have flourished in the sixth century. The Triads are collections of metrical triplets, for the most part commemorative of historical events, which appear in their present form to be a compilation of the thirteenth century, though founded on earlier records now lost. The 'Mabinogion' and the 'Damhegion' are two ancient fictions in the Welsh language. With a few occasional exceptions there has been little literary cultivation of the language of Wales since the country became incorporated with England. The Bible, however, and some religious works, have been translated into Welsh in modern times. The most memorable of the Welsh writers in Latin are the monkish chroniclers Gildas and Nennius, of the seventh century, and Giraldus Cambrensis and Geoffrey of Monmouth, who both lived in the twelfth.

5. The *Cornish.* The Cornish was a spoken language little more than a century ago, but is believed to be now altogether lost, with the exception of the Lord's Prayer, the Creed, and a short vocabulary. From these specimens it appears to have been a sister dialect of the Welsh. If any literary compositions ever existed in Cornish, they have wholly perished.

6. The *Norse.* This is the name given to the language spoken by the people of the Orkneys, and which perhaps is not yet altogether extinct

extremity of this plain, and consists of a narrow strip of very luxuriant alluvial land on both sides of the river. Along the eastern side of this vale, from Derbyshire to Bristol, runs an almost continuous range of hills, comprising the Wrekin, the Lickey, the Cotswold, and other groups of hills. On the east of this high land lies a central diversified district, which on its eastern border is contiguous to the Great Eastern Plain, and on the south terminates on the banks of the Thames. Its surface rises and sinks in gentle undulations, between which there are wide valleys, which in some parts spread out into plains.

The Great Eastern Plain extends from the river Humber to the mouth of the Thames, and is by nature divided into three different portions, a lower and two higher ones. The lower portion lies round that arm of the sea which is called the Wash, and extends to the south-west. It comprises the fenny district described under BEDFORD LEVEL and LINCOLNSHIRE. The northern higher portion of the Great Plain comprehends Lincolnshire north of Wainfleet and Sleaford; it is at a greater elevation than the fens, but is bounded along the coast by a low belt of marshes. The southern higher portion comprises the greater part of the counties of Norfolk, Suffolk, and Essex; it has a general level from 160 to 200 feet above the sea-level, and its surface is broken by gentle undulations.

A third region comprises the south of England, bounded on the north by the Thames and the Bristol Channel. In the eastern part of this region is a ridge of elevated land that extends from Dover north-north-west towards Reculver. Two parallel ranges of high ground extend nearly from east to west through Kent, leaving the towns of Maidstone, Ashford, Sevenoaks, &c., in the depressions or hollows. The two lines converge at Westerham, whence a single ridge, called the North Downs, extends to Guildford and Farnham. The country between the Kentish ridge and the Thames is gently undulating, and is for the most part very fertile.

The country between the North Downs and the English Channel is divided into two very unequal portions by the South Downs, which extend from Beachy Head to near Chichester; these South Downs have many hills from 500 to 900 feet in height, and afford excellent pasture for sheep.

Between the North and South Downs is the Weald of Kent, Surrey, and Sussex. This tract may be considered as a plain, though there are undulating spots in several places, and a few hills rise to a considerable elevation; but the elevations do not constitute a continuous high land, and are separated from one another by extensive flats. It is bounded on the east by the low land of Romney Marsh, which has been wrested from the sea.

Westward of the district just described is an upland or elevated plain, roughly bounded by a line drawn through Bagshot, Guildford, Farnham, Alton, Petersfield, Winchester, Salisbury, Shaftesbury, Westbury, and back by Salisbury Plain to Bagshot. Salisbury Plain is the most elevated part of this upland; but Bagshot Heath, Marlborough Downs, and Alton Hills are also elevated, compared with the surrounding country. The district between the upland and the sea is level and fertile as far as Southampton Water; beyond which occur the Hampshire heaths and the New Forest, bounded on the south-west by the Isle of Purbeck.

Westward of the upland district there are many alternations of surface. The country from the Vale of Berkeley to the Mendip Hills has a more broken surface than perhaps any other part of England. A range of high land extends from the uplands at Warminster to the Mendips at Shepton Mallet. The Mendips form the Somerset Mountains, and southward of them occurs an extensive tract of low land. The Quantock Hills extend along near the Bristol Channel, forming in one part the district of Exmoor. The Blackdown Hills extend from Bridport to near Exeter. The Vale of the Exe runs nearly north and south from Exmoor to Exmouth, and separates the greater part of Devon and the whole of Cornwall from the rest of England. Contiguous to the Vale of the Exe, on the west, is the high granitic plateau of Dartmoor, extending nearly to Tavistock; and many hilly offshoots from this mass cover considerable portions of Devon. The narrow valley of the Tamar forms the greater part of the western boundary of this county; beyond which lies the rugged and hilly county of Cornwall, which stretches like a peninsula into the Atlantic.

Wales.—This portion of Great Britain, is divided into two sections, north and south, by the valley of the Dyfi and the valley of the Upper Severn. The northern section, or North Wales, contains in its central district a very extensive mass of high land, which occupies more than one-third of the whole. The lowest tracts of this high land are probably not much less than 800 feet above the sea-level, and the cold climate renders the whole tract unfit for cultivation, except in a few sheltered places along the banks of the rivers. But even here the thin and stony soil yields only moderate crops of grain. This extensive country is consequently chiefly used for pasture.

Along the north-western edge of this elevated tract extends the Snowdon range, which contains the highest summits in South Britain, the pinnacle Wyddva being 3571 feet in height. A range of high hills branches off from this range south of the highest part, and runs to Caernarvon Bay, where it terminates south of Clynnog in the Reival, which is 1886 feet high. Between the Snowdon range and the Strait of Menai is an extensive and tolerably level plain. The central mountain-plateau has two series of elevated summits, which collectively cross the whole of Wales from east to west.

The country between the tributaries of the Upper Dee does not differ in its general description from the elevated mountain-region, except that the hills decrease in height and in steepness as they advance farther north. Some of the valleys are beautiful and fertile. By far the greater part of the surface of North Wales is fit only for pasture. The mountain-mass of Plinlimmon forms a kind of natural boundary between North and South Wales; it is a very extensive mass of rocky

heights, reaching in one part an altitude of 2463 feet.

Contiguous to the Plinlimmon range, and on its southern side, extends a vast mountain-tract of very desolate character. This is the most extensive waste in England, and resembles the Northern Highlands in Sutherland and Ross-shire. It contains no regular chains, but a succession of rounded hills and depressions, the surface of which is covered with moss and peat resting on clay. In some places there are extensive bogs. Among the peat and bogs are scattered tracts of pasture-ground, producing a very poor herbage, which affords summer pasture for a large number of small hardy sheep. From the Plinlimmon a range of hills runs north and south, nearly on the boundary between England and Wales; the northern half is called Radnor Forest, and the southern half the Black Forest. The valleys of the Wye and the Usk afford a few fertile spots in the midst of a region generally sterile.

The highest land in South Wales begins in the eastern districts of Caermarthenshire, traverses the southern part of Brecknock, and enters the northern portion of Monmouthshire. Some miles south of this mountain-system, and nearly opposite to its centre, are the mountains of Glamorgan. The tract which divides the two mountain-systems from one another is considerably lower than either of them, but nearly unfit for cultivation on account of the aridity of its soil. Along the southern declivity of this mountain-system is the Plain of Glamorgan, which extends over the southern district of that county. Its surface is undulating and intersected by numerous hills and ridges of small elevation. A low tract of coast country joins the Plain of Glamorgan to the Plain of Monmouth. Farther to the west lie the Precelly Mountains, which separate the country around Cardigan Bay from that around Caermarthen Bay, Milford Haven, and St. Bride's Bay: the latter district is a kind of uneven plain.

Rivers:—The following table shows the length of the principal rivers of Great Britain and the area drained by them:—

Names of the Rivers.	Length of their course. Miles.	Extent of the Basin. Sq. Mls.
The æstuary of the Humber, viz.		
The Ouse	120	4800
The Trent	144	4000
The æstuary itself	40	200
The æstuary of the Wash	...	5000
The æstuary of the Thames, viz.		
The Thames	200	4800
The Medway	55	700
The æstuary of the Severn, viz.		
The Severn	190	4500
The Wye	120	1400
The Tweed	100	1820
The Eden	72	1100
The æstuary of the Mersey, viz.		
The Mersey	62	550
The Weaver	55	500
The Tyne	80	950
The Tees	80	450
The Tay	150	2400
The Spey	96	1300
The Clyde	90	1200
The North Dee	70	900
The Ness, including the Garry	60	850
The Forth, exclusive of the Frith	60	840
The Lochie and Spean	50	530
The Nith	58	504
The Findhorn	80	500

Climate.—Being situated nearly in the middle of the temperate zone, Great Britain enjoys the advantages arising from such a geographical position. The difference between the climate of Great Britain and the neighbouring continent is chiefly due to its insular position, and its being exposed to the winds which blow across the wide expanse of the Atlantic Ocean. Great Britain is not subject to the same degree of heat in summer, nor of cold in winter, as the continental countries lying in the same parallel. The mean temparature of the whole year, at London is 50° 39′; and in the north of Scotland 46° 7′. The south-western part of England, especially the peninsula between the English and Bristol Channels, has a much milder climate than the countries farther east. Westerly winds prevail all over the island. Easterly winds however prevail on the eastern side of the island in the spring and summer months. The air of Great Britain contains a greater quantity of moisture than most other countries, which shows itself in the frequency and duration of fogs. Farther, it appears to be a fact that Great Britain has a greater number of rainy days than the countries of continental Europe; but at the same time it must be observed that the quantity of rain does not differ materially from that in other parts of Europe, the daily average being rather smaller in quantity. No part of the island is more exposed to rain than the district within and near the Cumbrian range; the mean annual quantity of rain which falls at Kendal amounts to 56 inches; and at Keswick, within the range, it is said to be as much as 67 inches.

The geology, mines, agriculture, commerce, manufactures, towns, and antiquities of Great Britain are described under the respective countries.

Area, Subdivision, and Population.—The area of Great Britain is estimated at about 83,827 square miles, viz.

England	50,387
Wales	7,425
Scotland	30,921
	88,734
Ireland	26,848
Guernsey, Jersey, and Alderney	118
Man	210
United Kingdom	115,910

The agricultural capabilities of Great Britain were thus estimated by Mr. Couling in 1827; if the estimate were correct at that time, it cannot be far wrong in 1848, as the relative quantities vary but slowly.

process is very easy in the case of a thin flat surface, and the approximation is quite sufficient for practical purposes.

GRAVITY, SPECIFIC. [SPECIFIC GRAVITY.]

GRAY, THOMAS, born in Cornhill, Dec. 26, 1716, was the son of a citizen and money-scrivener in London.

Gray was educated at Eton, where he made the acquaintance of West and of Horace Walpole, with the latter of whom he removed at the same time (the autumn of 1736) to Cambridge. He entered at Peter House, and continued to reside till September 1738, when he left without a degree. His time at Cambridge was devoted to classics, modern languages, and poetry.

In the spring of 1739 Gray set out, in company with Horace Walpole, on a tour through France and Italy. He was absent about two years and a half, when he and Walpole disagreed, and Gray turned his steps homewards, where he arrived in September 1741, just in time to be present at his father's death.

Gray had intended, on leaving Cambridge, to devote himself to the study of the law, and after his return he resided at Cambridge, and took the degree of B.C.L. The 'Ode to Spring' was written in 1742; and in the autumn of the same year were written the 'Ode on a Distant Prospect of Eton College,' and the 'Hymn to Adversity.' The 'Elegy in a Country Churchyard' was also commenced at this period, but not finished till seven years afterwards. In the meanwhile the 'Ode to Eton College' had been published (being the first of Gray's publications) in 1747, and little notice had been taken of it. The 'Elegy,' published in 1749, rapidly obtained an extensive popularity.

In March 1753, Gray lost his mother. During the three years following, Horace Walpale observes that Gray was 'in flower.' The 'Ode on the Progress of Poetry' and the 'Bard' were then written. In 1756 Gray removed, or (in the technical phrase) migrated to Pembroke Hall. On the death of Cibber in 1757 he was offered the laureateship by the Duke of Devonshire, which he declined. In 1768 the professorship of modern history at Cambridge became vacant, and Gray was appointed to it by the Duke of Grafton. In 1769 the Duke of Grafton was elected chancellor of the university, and Gray wrote the installation ode, which, considering the occasion, is singularly chaste and free from flattery. In the autumn of 1770 he made a tour in Wales, though he had been very unwell in the spring; and, after suffering for some months from a violent cough and great depression of spirits, he was suddenly seized, on July 24, 1771, with an attack of the gout in the stomach, which caused his death on the 30th of the same month.

Gray wrote little, but the little that he wrote was written with great care. Thus his poems, with the exception of one or two of a humorous character, are all much elaborated; and it follows that the quality which they chiefly display is taste. His 'Ode on the Death of a Favourite Cat,' the 'Long Story,' and many passages of his letters, show that he possessed considerable powers of humour.

An edition of Gray's 'Poems and Letters, with Memoirs of his Life and Writings,' was published by Wm. Mason, in 1775, 4to.; an edition of his Works by Mr. Mathias, in 2 vols. 4to., 1814, and an edition of his Poems and Letters by Mr. Mitford, first in 1816, in two vols. 4to., and subsequently in 4 vols. 12mo. To both of Mr. Mitford's editions is prefixed a memoir of Gray, which is the best that has appeared.

GRAY'S THURROCK. [ESSEX.]

GRAYLING. [SALMONIDÆ.]

GREAT BRITAIN. This name was familiarly applied to the island which is composed of England, Wales, and Scotland, at the time of the union of the crowns by James I.; but its legal application commenced at the time of the legislative union in 1706. Great Britain is the largest island in Europe. It is separated from the continent of Europe by the English Channel and the North or German Sea; St. George's Channel separates it from Ireland; and the Atlantic forms the rest of its boundary. The Lizard Point, the most southern part of Great Britain, is in 49° 58′ N. lat., and Dunnet Head, in Caithness, the most northern point, is in 58° 42′ N. lat. The most eastern point is Lowestoft, on the coast of Suffolk, 1° 46′ E. long., and the most western, Airdnamurchan Point, in Argyle, 6° 20′ W. long. The distance in a straight line between the Lizard Point and Dunnet Head is about 608 miles; and from the Lizard Point to the North Foreland about 320 miles. The coast-line is so deeply indented as to exceed 4000 miles. The area is about 83,827 square miles.

General Survey of its Surface and Soil.—Though Great Britain does not contain such elevated mountain-ranges as many parts of continental Europe, it probably exhibits a greater variety in surface and soil than any other European country of equal extent. We shall treat of the three portions, Scotland, England, and Wales, in succession.

Scotland.—The great glen of Scotland, or Glenmore, extends across the island from S.W. to N.E.; it contains the lochs Linnhe, Eil, Lochie, Oich, Ness, and the Moray Frith, and forms, with a few artificial cuts, the Caledonian Canal. This glen divides Scotland into two parts. The part to the N.W. is the most sterile portion of the island, not one five-hundredth part being fit for cultivation. Nearly the whole of it constitutes one enormous mass of rock, whose upper surface frequently extends in plains, but more usually is covered with rocks, many hundred feet above the general level of the mountain-plain. The level of the plain varies between 500 and 1500 feet above the sea. It has several summits exceeding 3000 feet in height; of which one, Ben Wyvis, is 3720 feet. It is cut by many long, deep, and narrow valleys, in the bottoms of which the streams run. The north and west margins are abrupt declivities on the sea coast; but on the east and north-east the plain is generally lower, and admits of more cultivation, especially near the margin of the Friths of Dornoch, Cromarty, and Moray. The inhabitants of the whole region are few, and the ground, if usefully applied at all, is mostly used for pasturing sheep.

The Grampian Hills form a range which traverses the whole breadth of Scotland in about 57° N. lat. From about Ben-y-gloe extends an offshoot called the North Grampians, which stretches northwards nearly as far as the great glen; and from near Loch Rannoch extends another branch southward, which incloses several lochs and friths near Loch Lomond. The Grampians contain the highest mountains in Scotland, among which is Ben Mac Dhu, 4390 feet high, or 20 feet higher than Ben Nevis. [ABERDEENSHIRE.]

The country between the great glen and the Grampians is separated into two sections by the North Grampians, or Cairn Gorm Mountains. The west section is a mountain-plain with an undulating and often hilly surface; it comprehends the valleys of the Spey, the Findhorn, the Nairn, and the Spean; and it is mostly heath and pasture-land. The east section is hilly; but, as its general surface is not so elevated as that of the west, agriculture is more practicable.

A sort of valley extends across Scotland considerably southwards of that of Glenmore; it stretches from the Frith of Clyde on the west to the Frith of Forth on the east, and forms a convenient boundary between South Scotland and Central Scotland. The country between this valley and the Grampians is traversed north and south by the South Grampians, which divide it into two regions. The west region contains a great proportion of unproductive land. It includes or borders on Loch Etive, Loch Awe, Glen Orchy, Loch Leven, Loch Rannoch, and the Mull of Cantyre. One portion is occupied by the Moor of Rannoch, which covers nearly 400 square miles, and which consists almost entirely of bog. The peninsula of Cantyre is the most productive portion of this region. The east region is covered through half its area with minor offshoots from the Grampians, intersected by tolerably fertile valleys such as those of the Earn and the Tay. East and south of this rugged country extends the fertile vale or plain of Strathmore, 80 miles long, from Stirling to Stonehaven. Still further eastward lie the Sidlaw and Ochill Hills, which bound the fertile plains and valleys of Fife, Kinross, Clackmannan, &c. The Campsie Hills stretch across the northern boundary of the vale, or rather plain, lying between the Forth and the Clyde, which plain contains the various roads, canals, and railways from Edinburgh to Glasgow.

Southern Scotland is in part occupied by a mountain mass, which lies in the direction of the greatest width of this part of the island, that is, from south-west to north-east. But the most considerable and extensive depression in it extends east and west, comprehending the valley of the Tweed from Melrose to Peebles and Lyne, and the valley of the Clyde from Covington to Lanark.

The country west and north-west of this mountain-region is mostly a plain, containing a few ranges of hills. The county of Wigton constitutes a separate natural division, being on the north surrounded by mountains, and on all other sides by the sea. The country east and south-east of the mountain-region is divided into two sections by the Cheviot Hills. The section between the Cheviots and the Frith of Forth contains the Lammermuir Hills, the plain or merse of Berwick, and a large area of the most fertile arable land in Scotland, except perhaps the carse of Gowrie. The south-west section of Scotland comprises a plain along the northern border of the Solway, and a somewhat more hilly country towards the Mull of Galloway; it is mostly used as pasture-land.

England.—The northern region of England, lying north of the Humber and the Mersey, is very mountainous. There is a mountain-range runinng nearly north and south through it, called the Pennine Chain, and extending from the borders of Scotland to Weaver Hill in Derbyshire; it is only five or six miles wide in Northumberland and Cumberland, but at its southern extremity it spreads out into the district known as the Peak of Derbyshire. There are several mountains in the chain above 2000 feet in height; one, Cross Fell, is 2901 feet.

West of the Pennine Mountains, and contiguous to the boundary of Scotland, is the Cumbrian Plain, the largest portion of which is under cultivation. South of the plain lies the extensive group of Cumbrian Mountains, described under CUMBERLAND. Opposite Morecambe and Lancaster Bays, the offshoots from the Pennine chain leave only a small strip of level land; but farther to the south the strip becomes wider. Between the Ribble and the Mersey extends a high tract, encircled by a broad belt of low and level country.

East of the Pennine Mountains, and contiguous to the Scottish Border, is the county of Northumberland, which is mostly a hilly district as far south as the Vale of the Coquet. South of this river commence extensive moorlands, which flank the eastern base of the Pennine chain throughout Durham and Yorkshire, and end at Holme Moss, in Cheshire. The width of these moorlands varies from 10 to 30 miles, and the elevation from 500 to 1000 feet. They are for the most part open solitary wastes of little value. The country from these moorlands to the German Ocean is moderately level, interspersed with hills of no great height. It is diversified by the Valley of the Coquet, the Valley of the Tyne, the Valley of the Tees, the Plain of York, the Eastern Moors, the Wolds of York, the Vale of Pickering, and the Plain of Holderness. Most of these vales are fertile. The Plain of York extends nearly from Darlington to Doncaster. The eastern moors occupy the north-eastern portion of Yorkshire; the Wolds of York lie south of the moors; and Holderness is a low, flat, and very fertile peninsula, in the south-east of Yorkshire.

A second region of England is bounded on the north by the region just described, on the west by a valley or depression running from the Mersey to the Severn, on the south by the Thames, and on the east by the German Ocean. In the northern part of this region is the plain of Cheshire and Shropshire, connected with the Pennine chain on the one hand and the Welsh mountains on the other. The Vale of Severn begins near the south

there. It is, or was, a Gothic dialect; but we are not aware that any composition in it exists except a version of the Lord's Prayer.

7. The *Anglo-Saxon.* This was the spoken language in a great part of Britain from the 6th century to the 12th. We possess a series of Anglo-Saxon literary compositions, in prose and verse, from at least the latter part of the 7th century, and, though the earlier specimens are both scanty and, in all probability, considerably corrupted, those of later times have come down to us in ample quantity, and to a great extent in perfect preservation. [SAXON LANGUAGE AND LITERATURE.]

8. The *English Language.* We cannot here attempt any detailed account of the formation and progress of the English language; but we may note the great epochs of its history, from its rise out of the Saxon in the 12th century to its settlement into the form in which it now exists.

For the first century after the Conquest the language of the body of the nation continued to be Saxon, substantially of the same character with that which had for ages before been spoken by their ancestors. The transmutation of the Saxon into English appears to have been principally effected by the intermixture of the conquered people and their conquerors, which began to take place in the 12th century; and it is probable that this change was the work, not of those to whom Saxon was vernacular, but of the foreigners who, in endeavouring to speak it, naturally mixed it with the vocables, and metamorphosed it by the imposition of the grammatical forms of their native tongue. The ancient forms of the language however were by no means at once thrown off, and in some respects what may be called its transition state from Saxon to English may be said to have lasted till the middle of the 15th century; but English was in all its essential characteristics the same language in the reign of Henry VIII. that it is now.

This much being premised, we shall now subjoin the names of the principal English writers in each of the great departments of literature, arranging them chronologically, and marking the centuries in which they severally lived. It is, of course, the principal names only that can be enumerated within our limits.

In poetry the literature of England is particularly rich. The 13th and 14th centuries produced Robert of Gloucester, the author of a metrical chronicle, which is mostly a translation from the Latin of Geoffrey of Monmouth; Robert Mannyng, the author of another work of the same kind translated from the French; Adam Davy, the author of some devotional poems; the writer of the Romance called 'The Life of Alexander;' and Lawrence Minot, the author of a series of poems on the warlike exploits of Edward III. These were followed soon after the middle of the 14th century by Langland, the author of the vigorous satire entitled 'The Visions of Pierce Ploughman.' Contemporary with Langland, though he probably outlived him, was the illustrious Geoffrey Chaucer, the true father of our English poetry. From Chaucer to the time of Henry VIII. appeared Gower, Occleve, Lydgate, Stephen Hawes, Alexander Barklay, and John Skelton.

A new æra, both in our poetry and in the language, is marked by the poems of Sir Thomas Wyatt and Henry Howard, earl of Surrey, in the latter part of the same reign. The next eminent names were those of Sackville, and the much more eminent Edmund Spenser. Spenser, again, may be regarded as ushering in the splendid train of the poets of the age of Elizabeth and James, among which the most eminent names, besides those of Shakspere and the other dramatists, are George Chapman, the translator of Homer; the satirist, Joseph Hall; Joshua Sylvester ('the silver-tongued Sylvester,' as he was called); the elegant Samuel Daniel, and the learned Michael Drayton, the two historical poets of their country; Giles and Phineas Fletcher, the cousins of the celebrated dramatist; the philosophical Sir John Davies; Edward Fairfax, the melodious translator of Tasso; Dr. John Donne; George Herbert; Thomas Randolph; Thomas Carew; and William Drummond, of Hawthornden. As forming a continuation of the same bright galaxy, and extending it over the middle portion of the 17th century, may be mentioned Richard Lovelace, Sir John Suckling, Robert Herrick, Sir Richard Fanshawe, Sir William Davenant, Sir John Denham, George Wither, Andrew Marvell, Abraham Cowley, Samuel Butler, and, by far the greatest in the list, John Milton, the fourth illustrious name that stands in the front rank of the array of the English poets, along with those of Chaucer, Spenser, and Shakspere. All these writers were by no means of one school, any more than they were of one character of genius; but still the poetry of all of them may be said to preserve under various modifications the same fundamentally English tone and spirit. After the Restoration a new kind of poetry arose among us, which was mainly an imitation of the French, and was distinguished from all that had preceded it in the English language, by taking its animation not so much from imagination and sentiment, as from wit, levity, and a polished facility. Edmund Waller, Sir Charles Sedley, Wentworth Dillon, earl of Roscommon, Charles Sackville, earl of Dorset, and Matthew Prior, may be noted as the most eminent leaders in this new style. Dryden, Lee, and Otway had more original powers. Parnell, Garth, Addison, and Congreve are the chief names that fill up the interval between Dryden and his great successor Pope. To these may be added Pope's contemporaries, Gay and Swift. For two-thirds of a century after he rose into fame, Pope was the god of all the imitators. Several poets of true genius, however, and of more or less originality, also arose during this period, the most distinguished of whom were Young, Thomson, Blair, Joseph and Thomas Warton, Collins, Shenstone, Churchill, Gray, Akenside, Armstrong, Goldsmith, Beattie, Johnson, Mason, and Darwin. Cowper however has the best title to be regarded as the restorer among us of a more natural poetry than that style which the brilliant success of Pope had so long established in the general opinion as the highest model. He may be held to have been the fore-

runner, though by no means the chief leader or exciting example, of the succession of great writers who within the last half century have so remarkably revolutionised our poetry, producing something like a revival of its Elizabethan spring, including Wordsworth, Coleridge, Shelley, Keats, Scott, Moore, Byron, Crabbe, and many other familiar names.

Along with the poets may be enumerated the principal writers in the department of prose fiction. This is a field that has only been cultivated among us with much success in comparatively recent times. Of the old English prose romances, the only one that is now generally remembered is the 'Arcadia' of Sir Philip Sidney. Along with that perhaps may be mentioned, as also a sort of poem in prose, which still enjoys great popularity, the 'Pilgrim's Progress' of John Bunyan. The principal modern English novelists are Defoe, Swift, Richardson, Fielding, Smollett, Sterne, Goldsmith, Moore, Holcroft, Mrs. Radcliffe, Mrs. Barbauld, Mrs. Opie, Miss Austen, Maturin, Scott, and various living writers of both sexes.

English eloquence, at least in so far as it has been preserved, is also a part of our literature that is chiefly of modern growth. From the middle of the last century there exists a voluminous collection of the speeches, more or less perfectly reported, in parliament and at the bar, of Burke, Fox, the younger Pitt, Sheridan, Erskine, Flood, Grattan, Curran, Wyndham, Canning, and others.

In theology, metaphysical and ethical disquisition, politics, criticism, æsthetics, and moral speculation generally, the most eminent English writers are the following. In the 14th century, Wycliff. In the 16th, Sir Thomas More, Sir Philip Sidney, Puttenham, Ascham, Latimer, Jewel, Andrews, and Hooker. In the 17th, Bacon, Milton, Dryden, Cowley, Hobbes, Harrington, Nevile, Algernon Sidney, Chillingworth, Cudworth, Henry More, Norris, Sir Thomas Brown, Jeremy Taylor, Barrow, Thomas Burnet, Tillotson, Leighton, Richard Baxter, Locke, and South. In the 18th, Steele, Addison, Swift, Mandeville, Lord Bolingbroke, Bishops Berkeley, Butler, Sherlock, Warburton, Hurd, Lowth, and Cumberland, Jortin, Hutcheson, Hartley, Lord Kaimes, Adam Smith, David Hume, Burke, Johnson, Hawkesworth, the unknown author of the 'Letters of Junius,' Reynolds, Reid, and Paley. In the 19th, Bentham, Ricardo, Dugald Stewart, Mackintosh, Mill, Archbishop Magee, Malthus, &c. To these might be added several writers of letters, which have not in all cases been intended for the press; such as Howell, Lord Chesterfield, Lady Mary Wortley Montagu, Horace Walpole, Cowper, &c. Many of these letters however partake of an historical, biographical, or otherwise narrative character.

In the great department of history the standard or classical works are few in number. Raleigh, Clarendon, Hume, Robertson, and Gibbon are the chief names before the 19th century. There were a few short contemporary histories by More, Herbert, Bacon, Temple, Swift, and others; and the Chronicles of Caxton, Fabyan, Hall, Grafton, Holinshed, Stow, and Speed. To these may be added Fox, the martyrologist. Of later recorders

of the events of their own times, memoir-writers, anecdote-collectors, biographers, &c., the list would be a very long one; we may mention Fuller, Strype, Mrs. Hutchinson, Evelyn, Pepys, Bishop Burnet, the Duchess of Marlborough, Granger, and Walpole, as among those most marked by piquancy or individuality of character.

These classes will comprehend nearly all that can be properly called the literature of any country. As for works on the mathematics, on mere professional subjects, on the arts of life, on statistics, geography, topography, and antiquities, they are usually no more any part of the literature of a language than are our grammars and dictionaries, or the statutes at large. There are however several works on natural history, as well as descriptions of countries, which belong to the class of works of elegant literature. The distinguished writers of scientific works need not be enumerated here.

9. The *Lowland Scotch.*—Literary composition in this dialect of the Saxon, which is still the popular speech throughout the greater part of Scotland, appears to have commenced at least as early as the latter part of the thirteenth century. The oldest fragment of Scottish poetry now known to exist consists of a few lines of lamentation on the death of Alexander III., which took place in 1286. In the next century appeared the 'Bruce' of John Barbour, and the 'Cronykil' of Andrew Wynton. The 15th century produced the 'King's Quhair' of James I., and the 'Sir William Wallace' of Harry the Minstrel. The next century is adorned by the names of Gawain Douglas, the translator of the 'Æneid,' and likewise the author of several original poems; of the admirable Dunbar, the Chaucer of Scotland, of Sir David Lindesay, of James V., not to mention many others of less note, such as Walter Kennedy, Quintyn Schaw, Robert Henderson, Holland, Montgomery, &c. After the death of Lindesay the spirit of Scottish song slept, or made itself audible only in a few occasional short poems by writers whose very names for the most part have perished, until it was re-awakened by Allan Ramsay, Ferguson, and, greatest of all, Robert Burns. In prose the Scottish dialect has received comparatively little literary cultivation.

English Drama.—The period in which we find the earliest traces of the general introduction of dramatic exhibitions by the clergy throughout the spiritual empire of Rome was that in which, under the régime of the Norman conquest, the old French language and literature had full predominance in England, and a very large proportion of its clergy were of Gallic extraction. The first pieces were either borrowed directly from continental writers, or were composed by the Anglo-Norman clerks in the Gallic idiom.

We find religious dramas to have been regularly established performances in London as early as 1180. But from Mathew Paris ('Vitæ Abbatum') and from Bulæus ('Historia Universitatis Parisiensis') we learn that the miracle-play of 'St. Katherine' had been exhibited at Dunstable before the year 1119. The oldest extant specimen of a miracle-play in English is among the Harleian

MSS. in the British Museum: it probably formed one of a series, and is certainly as ancient as the earlier part of the reign of Edward III.

The seasons for exhibiting these miracle-plays were chiefly the Christmas and the Whitsun holidays. The getting up and acting of these in the great cities early devolved upon the trading companies, each guild undertaking a portion of the performance and sustaining a share of the expense. The authentic information regarding the exhibition of the Corpus Christi plays at Coventry extends from the year 1416 to 1591. The Chester records establish the fact that the whole management of these representations there was in the hands of laymen. In London this class of performances was undertaken by the parish clerks (who were incorporated by Henry III.) as early as 1409; but no instance is to be found of the trading companies of London having been, at any date, so engaged. The pieces were acted on temporary erections of timber, called scaffolds or stages; and it appears that in some instances they were placed upon wheels, in order that they might be removed from one place to another. Though, in the beginning, these plays only dramatised certain scriptural events by the means of historical characters, yet abstract impersonations found their way into them by degrees, and thus they became a new species of drama unconnected with history. This was called a 'moral' or 'moral-play,' the object being to enforce and illustrate some ethical precept. They seemed to have reached their highest perfection under Henry VII.

Besides allegorical personages, there are two standing characters very prominent in moral-plays, the Devil and the Vice. The Devil was made as hideous as possible by the mask and dress which he wore. In 'The Life and Repentance of Mary Magdalen,' which appeared in 1567, the Vice performs the part of her lover, before her conversion, under the name of Infidelity. In the moral-plays, as in the miracle-plays before them, the comic ingredients were made to predominate more and more over the serious; and the Vice became a standing vehicle of grosser and more thorough buffoonery than the Devil himself. The performance of moral-plays was not wholly discontinued until the end of Elizabeth's reign.

The first English dramatic production in which it was attempted to exhibit sketches from actual life without any scriptural, saintly, or allegorical intermixture, belong to that class to which the denomination of interludes properly belongs, being, as their name imports, expressly designed for performance during the intervals of convivial entertainments. John Heywood, a musician of Henry VIII.'s household, set the first example of composing interludes quite independently of allegorical materials.

Among Heywood's pieces that have come down to us, the three which alone can strictly be termed *comic* are directed against the vices of the clergy, and more especially of the holy mendicants who swarmed over the land under the names of friars and pardoners. They have much of the genuine humour as well as broad satire of Chaucer's comic pictures.

'A newe, mery, and wittie comedie or interlude, treating upon the historie of Jacob and Esau' (apparently written about 1557, but not printed till 1568), though its subject is scriptural, makes nearer advances to the structure and general character of a modern play than any piece that preceded it.

The earliest piece of equal dimensions and regularity of structure that can properly be termed a comedy is an avowed imitation of the ancients. This is 'Ralph Roister Doister,' which was certainly in being as early as 1551, and probably written as early as the reign of Henry VIII. The author was Nicholas Udall, who died after 1564, having been master first of Eton and afterwards at Westminster School. Warton ('Hist. Eng. Poet.,' iii. 213) quotes from the ancient Consuetudinary of Eton School a passage importing that yearly about St. Andrew's Day, November 30, the master was accustomed to select, according to his own discretion, such Latin plays as were best and fittest to be acted by the boys in the following Christmas holidays, with scenic decorations, before a public audience; and that sometimes also he ordered the performance of plays in English, 'provided that he found any with sufficient grace and wit.' Another comedy, of the like dimensions and general structure, has lately been discovered in manuscript. It is entitled 'Misogonus;' and the author was apparently one Thomas Rychardes. This piece is ascertained to have been composed about 1560. It is certain that the former of these two comedies, and extremely probable that the latter, preceded the production of 'Gammer Gurton's Needle,' which all our literary and dramatic antiquaries before Mr. Collier have spoken of as the earliest English comedy, though, when it was acted at Christ's College, Cambridge, in 1566, its author, Still, afterwards bishop of Bath and Wells, was only in his twenty-third year. In merit it is inferior to the pieces just mentioned.

The earliest extant piece in English, that can now with any propriety be termed a tragedy, was written by Thomas Sackville (afterwards Lord Buckhurst and Earl of Dorset) and Thomas Norton, a barrister, and was acted before the queen at Whitehall, on the 18th of January, 1561. In the first and third printed editions it is called 'The Tragedy of Gorboduc,' from the name of a supposed ancient British king; but in the second it is entitled 'The Tragedy of Ferrex and Porrex' from the names of Gorboduc's two sons, who contend for sole possession of his kingdom after he has divided it between them. This was the first play in the English language the dialogue of which was written in blank verse. This tragedy was followed almost immediately by 'Julius Cæsar,' the earlist instance on record into which events from the Roman history were dramatised in English. From about this date until shortly after 1570, the dramatic field seems to have been pretty equally divided between the later moral-plays and the early attempts in tragedy, comedy, and history. It is observable, that the term comedy was from the beginning used in a more comprehensive sense than tragedy, being in fact very often employed as the general designation of play.

It was in the same year, 1583, wherein Sidney wrote his 'Apology,' that Elizabeth first allowed a public company to act under her name and authority. The dramatic writers who flourished in the brief interval between this period and that of the fullest development of Shakspere's genius did nothing very material to alter or improve dramatic art. The single exception that we are called upon to make is in favour of Christopher Marlowe, of whom we must observe, not only that his works exhibit greater vigour both of conception and of language than belongs to any of his contemporaries, but also that he was the first who established the use of blank verse upon the public stage, in lieu of rhyme, which in a great measure possessed it before he wrote.

The collection of Shakspere's plays, as commonly printed, affords the grandest and most instructive study of the progress of the romantic drama from the crudeness of its early state to the blended richness of its full maturity. [SHAKSPERE.]

Of Shakspere's younger contemporaries and competitors the principal are Ben Jonson, Beaumont and Fletcher, and Massinger. Jonson demands our more particular notice as the chief advocate and practiser, among the old English dramatists, of the imitation of the ancients. We have two tragedies of Jonson, and a number of comedies and masks. The mask nearly expired with Jonson: the only subsequent production in this way of any celebrity is the 'Comus' of Milton.

It is no mean honour to Beaumont and Fletcher, that after Shakspere, who stands alone in all dramatic history, they are entitled to the highest place among the romantic dramatists of England.

Massinger, Ford, Shirley, and other of the younger contemporaries of Shakspere not here mentioned, as well as Jonson, and Beaumont and Fletcher, are noticed under their respective names.

Such was the general condition of the stage down to the year 1642, when the invectives of the puritans against dramatic exhibitions were changed into prohibitory law; and in 1648 not only to act plays, but even to witness them, was made a penal offence. Nearly all the players now took arms on that side the interests of which seemed identified with the existence of their own profession. Many of them perished in the field: and, after the final close of the war, one company of actors only was formed out of the remains of all the former ones, and occasionally, with great circumspection, performed at private mansions in the vicinity of London.

Davenant as manager, and Betterton as actor, form a slender link of connection between the old stage and that of the Restoration. Under the auspices of the court Davenant introduced the Italian system of decoration, the costume as then understood, the opera music, and the use of the orchestra in general. A still more important innovation was, the permanent adoption of the practice of having the female parts personated by women instead of by boys. The old dramatic and theatrical system of England was neglected; and the assiduous study of that of France resulted in an almost entire denationalisation, both in form and spirit, of the current dramatic literature.

It was left for the industry and fertility of Dryden to give the new theatre a thorough establishment according to the new ideas. The drama of the day became a strange compound of the extreme licence of the later writers of the earlier English school with the conventional stiffness and formality of the French, but without any of the natural and vigorous spirit which had animated either.

One tragedy of Lee's and two of Otway's have maintained a theatrical existence, but Dryden's dramatic writings have fallen into entire neglect. Shadwell's 17 comedies have ceased to be acted. Wycherley's 'Country Wife' has been retained on the stage, by means of adaptation and purification, under the title of 'The Country Girl.' Congreve's 'Love for Love' is the only one of his pieces the licentiousness of which it has been found possible to prune sufficiently for performance in later years.

The continuance, and even increase, of this moral depravation of the drama produced at length, in 1698, a severe castigation from the pen of the sturdy nonjuror, Jeremy Collier, under the title of 'A short View of the Immorality and Profaneness of the English Stage, together with the Sense of Antiquity on this Argument,' which had a permanent effect on the stage as well as on the public mind. This effect, however, was operated only by degrees. Vanbrugh followed in the line of Congreve, with little more regard either to morality or decorum, though mingling more humour with his wit. His contemporary, Farquhar, though displaying sufficient libertinism of language and sentiment, did not carry them to so gross an excess. The 'Beaux' Stratagem' and two other of his pieces are in public favour to the present time. The numerous comedies of Mrs. Behn, who wrote under Charles II., are remarkable only for licentiousness. In Mrs. Centlivre however, a prolific writer of comedy, exactly contemporary with Farquhar, we find more genuine dramatic talent. The 'Busy Body,' The Wonder,' 'A Bold Stroke for a Wife,' &c., remain as stock pieces. Just at the same period also Cibber produced his best comedy, 'The Careless Husband.' Fielding commenced his literary career as a writer of comedy, and also requires notice in dramatic history as one of the principal of those writers for the stage who afforded a pretext for the act to limit the number of theatres, and subject dramatic performances to the lord chamberlain's licence. In a very similar predicament was Gay, after the appearance, in 1727, of his 'Beggar's Opera.' Its professed object was, by way of burlesque, to ridicule the Italian Opera. But the persons in power took so much of the satire to themselves, that the lord chamberlain refused to license for performance a second part of it entitled 'Polly.' This celebrated production, however, is now chiefly remarkable in dramatic history as the prototype of a new species of dramatic composition upon the British stage, since known as 'the English opera.'

We must now revert for a moment to the history

of modern English tragedy. After the example of Lee and Otway, Southern and Rowe endeavoured to return to a more natural tragic tone and style than those which Dryden had so long practised and inculcated. Addison's 'Cato,' notwithstanding the great temporary celebrity which party rivalry conferred upon it, merits no attention in the history of dramatic art, except as having been the first of a series of frigid productions in imitation of the French classic school, by Young, Johnson, Thomson, Glover, &c.

It was left for one qualified to be the great actor of nature to lead forth the sublime poet of nature from his long theatrical obscurity. The clear, deep, quick, and varied truth which appeared in Garrick's interpretation of Shakspere's leading characters was nothing less than a revelation to the play-going public of that day. Not only the dramatic taste but the standard of acting was raised at once to its ancient elevation, which has been since maintained by Mrs. Siddons, John Kemble, Kean, and other tragedians, as well as numerous comedians of great ability.

Garrick himself, having made no great attempt in dramatic composition, exposed himself to no considerable failure: one or two of his small afterpieces have kept possession of the stage; but his labour of this kind most worthy of mention is probably the share which he took in the composition of one of Colman's best comedies, 'The Clandestine Marriage.' Cumberland's comic powers were only respectable. The 'Douglas' of Home has retained public favour chiefly by interesting and pathetic situations. Sheridan gave new life and spirit to genteel comedy, in which department he remains at the head of the writers of the present æra. The dramatic merits of Goldsmith were of a totally different cast: a certain eccentric drollery of character and whimsical extravagance of plot are the distinctive characteristics. Nor among the comic dramatists must we forget to mention Samuel Foote, who has been more commonly than appropriately called the English Aristophanes.

It was towards the close of the century that the sentimental dramas of the German school of Kotzebue acquired a footing in England. In this kind, among the direct adaptations from the German, 'The Stranger' has had the most general success, and is the most perfect representative of the species. Among the native efforts in the same line, Holcroft's 'Road to Ruin,' still popular, is one of the most meritorious. The same writer has the credit also of having first introduced on the English stage the melo-drama, which has since filled so large a place upon it. Mrs. Inchbald produced many pleasing original pieces in the lighter comedy. M. G. Lewis, in his 'Castle Spectre,' drew from a very different German source, in his taste for the marvellous and the terrific. Lord Byron's tragedies were not designed then for representation, but his 'Werner' is still acted with success. Sheridan Knowles undoubtedly stands at the head of several dramatists now living, who have displayed higher dramatic ability than many of the writers already mentioned.

GREAVES. [Armour.]

GREAVES, JOHN, an eminent English mathematician, scholar, and antiquary, was born at Colmore, near Alresford, Hampshire, in 1602; went to Balliol College, Oxford, in 1617; was elected fellow of Merton in 1624, and appointed geometry professor of Gresham College, London, in 1630. In 1637 he undertook a journey to the Levant and Egypt, with the view of examining such antiquities as might serve to illustrate ancient authors, and of making astronomical and geographical observations. He spent about a year at Constantinople, and in the summer of 1638 proceeded to Egypt, where his chief performance was a survey of the pyramids, of which no satisfactory account was then extant; this was published under the title 'Pyramidographia,' in 1646. He was appointed Savilian professor of astronomy in November 1643, and immediately after deprived of his Gresham professorship for neglect of duty. Being of the Royalist party, he was ejected from both fellowship and professorship in 1648; a matter of the less moment, inasmuch as he had a competent patrimony. He died October 8, 1652.

GREBES. [Divers.]

GREECE. Ancient Greece lay between 36° and 40° N. lat. It was bounded on the N. by Illyricum and Macedonia, from which it was separated by an extensive range of mountains. The name Greece (Græcia) has come to us from the Romans, and the name Greeks also comes from the Latin word Græci. The Græci however were only one of the ancient tribes of Epirus (Aristot., 'Meteor.,' i. 14), and never became of any historical importance. In the Greek authors the country comprehended within the above limits is called Hellas, though Hellas was also used to denote the country of the Hellénes wherever they might be settled.

Greece is divided into two parts, which are united by the Isthmus of Corinth. The northern part contained Thessaly; Epirus; Acarnania; Ætolia; Locris, divided into Opuntian and Epicnemidian Locris, and Ozolian Locris; Doris [Dorians]; Phocis; Bœotia; Megaris; and Attica. The southern part, called Peloponnesus, contained Laconia; Messenia; Arcadia; Elis; Argolis [Argos]; Achæa; Sicyonia; and Corinth. In addition to these states, we must reckon the numerous islands on the eastern and western coasts which were inhabited by the Greek race.

The relation of the peninsula of Greece to the rest of Europe, in a physical point of view, is indicated in the article Europe.

According to an estimate of Mr. Clinton ('Fasti Hellenici,' vol. ii. p. 386), in which he includes the population of the islands of Eubœa, Corcyra, Leucadia, Ithaca, Cephallenia, Zacynthus, Cythéra, Ægina, and Salamis, Greece contained a population of more than 3,500,000 inhabitants from the time of the Persian wars to the death of Alexander the Great. Greece, including the islands already named, contains about 22,231 square miles; consequently there were rather more than 157 persons to the square mile, a rate of population very little inferior to that of Great Britain in 1821, which contained 165 persons to the square mile. But it

must be remarked that, though we may admit the result of all the combined evidence to prove that Greece was well peopled during the period to which Mr. Clinton's estimates refer, we by no means admit that his calculation of positive numbers rests on a basis which, for any country or age, can give trustworthy results.

The first period of Grecian history may be conveniently considered as extending to B.C. 1184, the supposed date of the siege of Troy. This obscure mythological period, or at least the greater part of it, lies beyond the limits of genuine history.

The second period extends from the siege of Troy to the commencement of the Persian wars, B.C. 500, during which the Greeks sent colonies to Asia Minor; to Cyrene, in Africa; and to Sicily, and the southern parts of Italy.

The two states of Greece which attained the greatest historical celebrity were Sparta and Athens. The power of Athens was of later growth; but Sparta had from the time of the Dorian conquest of the Peloponnesus, in the 80th year after the Trojan War, taken the lead among the Peloponnesian states, a position which she maintained by the conquest of the fertile country of Messenia, B.C. 688. Her superiority was probably owing to her political institutions, which are said to have been fixed on a firm basis by her celebrated lawgiver LYCURGUS, B.C. 884. At the head of the polity were two hereditary chiefs, but their power was greatly limited by a jealous aristocracy. Her territories were also increased by the conquest of Tegea in Arcadia. Athens only rose to importance in the century preceding the Persian wars; but even in this period her power was not more than a match for the little states of Mégaris and Ægina. The city was long harassed by intestine commotions, till the time of Solon, B.C. 594, who was chosen by the citizens to frame a new constitution and a code of laws.

In the sixth century before the Christian æra Greece rapidly advanced in knowledge and civilisation. Literature and the fine arts were already cultivated in Athens under Pisistratus and his sons; and the products of remote countries were introduced into Greece by the merchants of Corinth and Ægina.

The third period comprehends the time from the commencement of the Persian wars to the death of Philip, king of Macedonia, B.C. 336; it was the most splendid period of Grecian history. It comprehends the great events of the battle of Marathon, B.C. 490, and the battle of Salamis, B.C. 480, and Platæa, B.C. 479, in which the invading force of the Persians was defeated. After the battle of Platæa a confederacy was formed by the Grecian states for the purpose of carrying on the war against the Persians. Sparta was at first placed at the head of it; but the allies, disgusted with the tyranny of Pausanias, the Spartan commander, gave the supremacy to Athens. The power of Athens now rapidly increased; she possessed a succession of distinguished statesmen, Themistocles, Aristides, Cimon, and Pericles, who all contributed to the advancement of her power. Her maritime greatness was founded by Themistocles, her revenues were increased by Pericles, and her general prosperity, in connection with other causes, tended to produce a greater degree of refinement than existed in any other part of Greece. Literature was cultivated, and the arts of architecture and sculpture, which were employed to ornament the city, were carried to a degree of excellence that has never since been surpassed. The mutual jealousy of Athens and Sparta caused the long war of 27 years (B.C. 431–404), called the Peloponnesian War. It terminated by again placing Sparta at the head of the Grecian states, a position which in time created the same jealousy of Sparta which had formerly existed with respect to Athens. The Corinthians, Thebans, Argives, Athenians, and Thessalians combined to throw off the Spartan dominion. The confederates were not however successful in the attempt; and the Spartan supremacy was again secured for a brief period by a general peace made B.C. 387, usually known by the name of the Peace of Antálcidas. Ten years afterwards the rupture between Thebes and Sparta began, which led to a general war in Greece, and for a short time placed Thebes at the head of the Grecian states. After the death of Epaminondas at the battle of Mantinea, B.C. 362, Thebes again sunk to its former obscurity. From the conclusion of this war to the reign of Philip of Macedonia, Greece remained without any ruling power. The defeat of the Athenians at Chæronea, B.C. 388, secured for the Macedonian king the supremacy of Greece.

The fourth period comprehends the time from the accession of Alexander the Great to the throne of Macedonia in B.C. 336 to the Roman subjugation of Greece, B.C. 146. This period comprises the eastern conquests of Alexander, the establishment of various Greek kingdoms by his successors, the history of the Ætolian and Achæan leagues, and the subjugation of Greece by Rome, B.C. 146. The history of Greece from this period forms part of that of the Roman Empire. It was overrun by the Goths in A.D. 267, and again in A.D. 398, under Alaric, and, after being occupied by the Crusaders and Venetians, at last fell into the power of the Turks on the conquest of Constantinople.

Language and Literature.—The Greek language forms a branch of that extensive family of languages which are known by the name of Indo-Germanic, to which belong the Sanscrit, the Zend, the Teutonic languages, and others. The affinity which subsists between all these languages is evident, not merely from the number of words which are common to them all, but also from the similarity of their grammatical forms. The same words are used in most of these languages for the pronouns, the numerals, and the most simple of the prepositions.

The Greek has existed as a spoken language for at least 3000 years, and has been more widely diffused than any other tongue, except the Arabic and English. It had attained a great degree of perfection in the ninth century before the Christian æra; and it was eventually spoken not only in Greece and the numerous Grecian colonies, but was extended over a large part of Western Asia by the conquests of Alexander. It is also evident, from the books of the New Testament, that the

lower orders in Palestine could converse in Greek as well as in their native Syriac; and many of the books of the New Testament were written in Greek by men who had received very little education. In Egypt also, under the Ptolemies, Greek became the language of a large proportion of the townspeople, and was used, jointly with the native language, in the business of administration. The conquest of Greece by the Romans tended still further to the diffusion of the Greek language; and all well-educated Romans learnt it. Under the dominion of the Cæsars the language and literature of Greece were cultivated in almost every part of the Roman dominions.

The Greek language is usually divided into four dialects, the Æolic, Ionic, Doric, and Attic, the peculiarities of which are noticed in separate articles. The number and superiority of the Attic writers gradually caused this dialect to be adopted by Greeks who were not natives of Attica; and thus the Attic dialect, somewhat modified by the peculiarities of other dialects, was called the common or Hellenic dialect (ἡ κοινὴ or ἡ Ἑλληνικὴ διάλεκτος), in which almost all Greek prose writers from the time of Aristotle composed their works. Writers in this common dialect are, Aristotle, Theophrastus, Polybius, Diodorus, Strabo, Plutarch, Dionysius of Halicarnassus, Lucian, Ælian, Dion Cassius, Appian, and many others; though some of these writers, such as Lucian, Arrian, in his 'Anabasis,' Ælian, &c., endeavoured to write in the pure Attic dialect, and to avoid every phrase which was not sanctioned by some Attic writer such as Xenophon or Thucydides. In the countries where the Macedonians established themselves the Attic dialect received many modifications; and as Alexandria in Egypt was, under the Ptolemies, the principal place where this dialect was cultivated, it was called the Alexandrine or Macedonian dialect. The Greek spoken at Constantinople became corrupted, and so many foreign words were introduced into the language, that a glossary is necessary for understanding the later writers of the Eastern or Byzantine Empire.

The study of the Greek language, after being much neglected in the west of Europe for nearly a thousand years, was revived in the fifteenth century by the Greeks, who were spread over Europe after the taking of Constantinople by the Turks. It is however an error to suppose that Greek was unknown in western Europe and in this island until the so-called revival of literature, though it is true that about the time above mentioned the study of it began to be prosecuted with greater activity. Of late years the study of the language and the literature of the Greeks has been pursued, especially among the Germans, with great success.

The history of Greek literature may be divided into three periods: the first extending from the earliest times to the rise of Athenian literature; the second comprising the flourishing period of Athenian literature; and the third comprehending all the writers from the time of Alexander to the taking of Constantinople by the Turks. For a useful list of works relating to the language, literature, and arts of the Greeks, the reader may consult the article 'Greece' in the 'Penny Cyclopædia.' Since that article was written, Thirlwall's 'History of Greece' has been completed, and Grote's 'History of Greece' has been commenced.

GREECE, KINGDOM OF, consists of three great divisions, namely, Northern Greece, the Peloponnesus, and the Islands. The boundaries of Northern Greece, as determined by the commissioners of the three allied powers, Great Britain, France, and Russia, are formed by a line, somewhat tortuous, drawn across the continent from the Gulf of Volo on the east to that of Arta on the west, which is about 137 miles long, and defined by ninety-five landmarks placed on the most important points. The line begins on the east at the mouth of the river Surbiotico, on the Gulf of Volo, about 39° 11′ N. lat., and 22° 42′ E. long. After striking the Gulf of Arta, the boundary crosses the gulf in a west-south-west direction, and reaches the low sandy promontory south of its entrance, called La Punta, the reputed site of Actium, which it intersects, and then terminates on the coast of the open sea a few miles to the north of the extreme point of the island of Santa Maura. ('Memoir on the Northern Frontier of Greece,' by Lieut.-Col. Baker, in the 'Journal of the Geographical Society of London,' vol. vii. 1837, with a map. Col. Leake's map attached to his 'Travels in Northern Greece,' 4 vols. 8vo., London, 1837, has also the boundary-line marked upon it.)

The country south of the above line, extending as far as the Isthmus of Corinth, forms the division called Northern Greece, and is bounded to the west by the Mediterranean, east by the Euripus, or Channel of Eubœa, and the Ægean Sea, and south by the Gulf of Corinth. It includes the antient territories of Acarnania and Ætolia, which are distinguished by the name of Western Greece, and those of Doris, Phocis, Bœotia, Attica, Megaris, the country of the Locri Opuntii, and the valley of the Sperchius, which constitute the division called Eastern Greece. The physical description of the country is found under the heads ACARNANIA, ÆTOLIA, ATTICA, BŒOTIA, PHOCIS, &c. The country is in great part mountainous. The principal range is that of Œta, which, beginning on the east on the coast of the channel of Eubœa, runs nearly due west across the country, joins the group of Mount Tymphrestus in Ætolia, and is only separated from the mountains of Acarnania and Epirus by the valley of the Aspropotamos. Offsets from the range of Œta connect it on the south with the ridge of Parnassus in Phocis, and with the mountains that border the northern coast of the gulf of Corinth, whilst to the south-east are the ridges of Helicon, Cithæron, and Parnes, the last of which separates Bœotia from Attica. The area of Northern Greece has been vaguely reckoned at about 8800 square miles.

The country is divided, according to a very old municipal arrangement, which existed long before the Turkish conquest, into eparchies, or districts, which are subdivided into communes, or villages.

Eastern Greece contains eleven eparchies. It was estimated a few years ago that Eastern Greece contained 32,550 families, and Western Greece 19,000. If families are reckoned at four individuals each, which appears to be the average at present, the whole population of Northern Greece would be about 206,000.

The second great division of the kingdom of Greece is the peninsula of the Peloponnesus, or Morea, the area of which is nearly equal to that of Northern Greece, but it is more densely inhabited, and better cultivated. It is divided into 35 eparchies. A description of the physical geography of the country is given under the respective heads Achaia, Arcadia, Argolis, Elis, Laconica, &c. The whole population of the Peloponnesus was reckoned by Thiersch about twelve years ago, at 108,000 families, which, taking an average of four individuals for each, makes 432,000 inhabitants, although the Commission of Statistics established by Capo d'Istria in 1828 estimated it only at about 370,000. Before the War of Independence the population both of the Peloponnesus and of Northern Greece was much greater.

The third great division of Greece consists of the islands in the Ægean Sea, including the Cyclades and the Spórades, besides the large island of Eubœa. [Eubœa.] The other inhabited islands are distributed as follows:—1. The Western Sporades, namely, Hydra, with 20,000 inhabitants; Spezia, with 18,000; Ægina, 5572; Poros, 4464; Salamis, 1124; Angistra, 1552. 2. The Northern Sporades, namely, Scopelos, 6515 inhabitants; Khilidromi, 240; Skiathos, 1532; Skyros, 1578. 3. The Northern Cyclades, namely, Andros, 5000 inhabitants; Zea, 3112; Thermia, 2050; Tino, 22,000; Mikoni, 4012; Syra, 30,000, the most flourishing island of Greece. 4. The Central Cyclades, namely, Naxos, with 10,800 inhabitants; Paros and Antiparos, 4751; Siphnos, or Siphanto, 4431; Seriphos, 3200; Milo, 1458; Kimolos, 420; Polikandro, 1200; Sikino, 1100; Nio, 2177; Amorgo, 2567. 5. The Southern Cyclades, namely, Santorin, 9656; Anaphi, 643; and Astypalæa, 951. Chios, Samos, Lesbos, and the other islands near the coast of Asia Minor, still belong to Turkey; and Crete, to the Pasha of Egypt.

The whole population of the islands belonging to the kingdom of Greece (which is better ascertained than that of the continent) is reckoned at about 176,000, which, added to the 206,000 of Northern Greece and the 432,000 of the Peloponnesus, gives a total of 814,000 for the population of the whole kingdom; but this estimate was merely an approximation even several years ago, and may be very far from the truth now.

The inhabitants of Northern Greece are distinguished by the name of Roumeliotes, while those of the Peloponnesus are styled Moreotes, and there is but little sympathy between the two. The Roumeliotes are a military people who have maintained in the mountains of the interior a sort of wild independence, which the Turks could never entirely subdue. The Moreotes, with the exception of Maina, had completely submitted to the Turkish yoke; and their archontes, or primates, shared with the pashas and other agents of the Porte the spoils of their own countrymen. In Roumelia the population of the mountains of Parnassus, Agrapha, Baltos, Xeromenos, and other interior parts of Ætolia, is of Hellenic stock; but the peasantry of the plains are chiefly Wallachians, Bulgarians, or Albanians, and are a steady quietly disposed people. In the towns near the coasts the population is a mixture of many races.

In the Peloponnesus the Albanian race occupies Argolis and Triphylia: the rest of the population speak Greek. The peasantry in the plains are not proprietors, all the land belonging either to the state or to the wealthy families of the primates or archontes. In the mountains there is a great number of small proprietors, generally thrifty and industrious husbandmen, and their dwellings are much better than those in the plains; many have neat gardens around them, especially in Arcadia and Laconica. In the towns the population is as mixed as in those of Roumelia, consisting in great measure of families who emigrated from various parts of the Levant, after the Turkish conquest, to exercise various trades, or to manage the affairs of the Beys and other wealthy Turks.

In the islands there is a mixture of Albanians and Greeks, and descendants of the Latin invaders of the middle ages. Besides these races there have been since the Revolution large immigrations of military refugees from various parts of the Turkish Empire.

There is moreover a mixed body of Fanariotes from Constantinople, some of whom are well-informed men, but generally speaking they are in bad repute with the people; of emigrants from the Ionian Islands, who came chiefly to fill up the offices, or seek their fortunes under their countryman Capo d'Istria's administration; of Asiatic Greeks, Epirotes, and adventurers from Italy, France, and other parts of Western Europe. (Thiersch, 'De l' Etat Actuel de la Grèce,' vol. i., part 2, 3rd section, 'On the Character and Habits of the various People who inhabit Greece.')

The resources of the continental part of the kingdom are derived chiefly from agriculture. There are about 120,000 families of cultivators of the soil, of which 20,000 are proprietors. According to the returns of 1829, there were in Northern Greece 2,883,000 stremata of cultivated land, which is not one-twelfth part of the surface of the country. The strema is a square of 40 paces on each side, and the value of a strema of cultivated land to a purchaser varies from 2*l*. 10*s*. sterling to 14*l*., according to the various districts. The vineyards are almost all private property. There are also about 215,000 olive trees, chiefly in Attica, Megaris, and the eparchy of Salona, a great part of which is national property. It must be observed that the returns as to the value of land were very inexact, the peasantry having an interest in underrating their property. In the Peloponnesus the returns were still more defective, but there were understood to be about ten millions of stremata of cultivated land, of which more than two-thirds were national property. In Eubœa, almost all the land, being owned by the Turks,

came by the Revolution into the hands of the state, which has sold part of it. In the other islands the land is all private property. Greece produces about two-thirds of the corn required for its consumption. Wheat, barley, and Indian corn are the species cultivated; oats and rye are not in use. Tobacco thrives, especially near Argos and Calamata, and cotton grows also in considerable quantity. The wine made is enough for the home consumption; it is generally good-bodied, but for want of proper management in making it, and of cellars, it does not keep beyond a year or two. Currants are cultivated in various districts, especially in the eparchies of Patras and Vostitza, and are of excellent quality. The olives are of good quality, but the art of pressing and refining the oil is very imperfectly understood, and the oil is inferior to that of Provence. Silk is made in Messenia and Laconica, and also at Tinos and in other islands, but is inferior to the Italian silk. The almond, the fig, the chestnut, the orange, and the lemon thrive well. Horned cattle are not numerous, nor sufficient for the labours of the field, for which they are almost exclusively used, and oxen are imported for that purpose from Thessaly and Asia Minor. There are however numerous flocks of sheep and goats, which migrate to the mountains in the spring, and return to the plains after the harvest. The produce of wool is considerable, but of a coarse kind, and is used chiefly for home manufacture. Pigs are scarce, except in Arcadia. The only milk used is that of ewes and goats, and the butter and cheese made of it is very inferior. Asses are chiefly employed as beasts of burthen; the horses are of a strong breed, but neglected.

The fine forests with which the mountains were once clothed have been sadly wasted, and for the most part entirely destroyed, in great measure by the carelessness or wanton rapacity of the inhabitants themselves, and the mountains are now naked and barren, and the springs dried up in consequence. Forests however remain still on the Taÿgetus, on Mount Cronion and other mountains of Arcadia, on those of Megaris, on the ridges of Parnassus and Helicon, and on part of the Œta range. The pine is the most common timber-tree, but fine oaks are found in some of the mountainous parts.

The commerce and navigation of Greece are centered in the ports of Nauplia, Mesolonghi, Patras, Galaxidi, and the islands of Hydra, Spezia, and, above all, Syra, where a handsome town has risen since the war, with churches, schools, hospitals, docks, warehouses, lazzarettos, and companies of insurance, chiefly the work of the emigrants from Chios and Psara, who escaped from the massacres of the Turks in 1824. The number of Greek merchant vessels in 1832 amounted to above 1000, exclusive of small craft, or coasting boats. The extensive line of coast and the numerous islands supply a multitude of good sailors. The principal traffic of the Greek vessels is the carrying trade between the ports of the Mediterranean and the Black Sea.

The events of the Greek Revolution, which began in 1820, and of the war between the Greeks and Turks, which lasted ten years, till the end of 1829, are well known through the works of Leake, Stanhope, Blaquiere, and many others. The independence of Greece was finally established by the intervention of Great Britain, France, and Russia. The complicated events of the civil war, which followed the appointment of Count Capo d'Istria to be President of the new state of Greece in February 1828, are related by Thiersch in the first volume of his work. In 1833 the allied powers offered the crown of Greece to the king of Bavaria for his younger son Otho, then a minor, and Otho, accompanied by a council of regency, and a body of Bavarian troops, arrived at Nauplia in February 1833, and was acknowledged by the Greeks as their king. In June 1835, King Otho, being of age, took the direction of the affairs of state. The government is a constitutional hereditary monarchy, with two legislative houses—a senate, and house of representatives.

GRECIAN ARCHITECTURE. [Civil Architecture.]

GREEK CHURCH. The Greek or Eastern Church is that part of Christendom which separated from the Roman or Western Church in the ninth century. Even previously to that epoch there were several dissensions between the patriarchs of Constantinople and the popes of Rome, who claimed a supremacy over all the churches of Christendom; but the decided breach between the two churches dates from the year 862, under the Patriarch Photius. Photius reproached the Western Church with the wanton addition of the word 'Filioque' ('and the son') to the words 'I believe in the Holy Ghost the Lord and giver of life, who proceedeth from the Father,' contained in the Nicene Creed, and which he declared to be an antiscriptural doctrine. He reproaches them also with having introduced several innovations unknown to the primitive Christian church; as, for instance, the celibacy of priests, the repetition of the anointment, with the chrisma (confirmation), and the fastings on Saturdays; but he particularly inveighed against the assumption of the Roman bishops in considering themselves as the head of all Christendom, and treating the Greek patriarchs as subordinate to them. The final separation however of the Eastern from the Western Church did not take place till 1054, under the patriarch Michael Cerularius, who, in addition to the matters alleged by Photius, attacked the Latins for using unleavened bread at the communion, and for the profligacy of their clergy, &c., for which he was excommunicated by Pope Leo IX. The attempts at uniting the two churches, which were made either by the popes, in order to extend their dominion over the East, or by the emperors of Constantinople, who, being pressed by the Mohammedans, sought assistance from the Western powers, generally failed through the pride and interested motives of the leaders of both the parties. The last attempt at uniting the two churches was made by the Emperor John VII. Palæologos, who, being driven to extremity by the Turks, came to Italy, and, at the council of Florence, in 1438, acknowledged the supremacy of the pope. This union was however not accepted either by the Greek clergy or by the people.

The Greek Church, like the Roman Catholic, acknowledges a double foundation of faith—the Bible, and tradition, as recognised by the Greek fathers, and by the first seven Œcumenic Councils of the Church. [COUNCILS.] It forbids the patriarch and the synods to introduce any new dogma, but considers a full belief in those already established as indispensable to salvation. It maintains that the Holy Ghost proceeds only from the Father, differing in that point from the Roman Catholic Church as well as from all Protestant churches. It admits seven sacraments: baptism; the chrisma; the communion, preceded by auricular confession; penitence; priesthood; matrimony; and extreme unction. But it differs from the Western Church in the points mentioned above as having been urged by Photius.

The fasts are much more numerous and strict than those of the Roman Catholics. Besides Wednesday and Friday in every week they have four great fasts in the year: Lent, or the fast of 40 days before Easter; another fast which lasts from Trinity Day to the feast of St. Peter and Paul, 29th of June; a third which continues from the first to the 15th of August; and a fourth beginning at St. Philip's Day, on the 15th of November, and ending at Christmas. During all this time they abstain, not only from meat, but also from milk, butter, and eggs.

The Greek convents follow the strict rule of St. Basilius. The abbot of a Greek convent is called Higumenos, and the abbess Higumena. The abbots who superintend several convents have the title of Archimandrite, and rank next to bishops. All the high ecclesiastical dignities, as bishops, archbishops, and metropolitans, are chosen from the regular clergy; while the secular can rise only to the rank of Protopapas, which is only one degree higher than that of an ordinary priest.

The Greek Church, under the Turkish dominion, has preserved almost entirely its ancient organisation. It is governed by the patriarchs of Constantinople, Alexandria, Antioch, and Jerusalem, of whom the first, as the Œcumenic patriarch, presides over the general synods of Constantinople, which are composed of the above-mentioned patriarchs, several metropolitans and bishops, as well as twelve eminent Greek laymen. He exercises a supreme ecclesiastical authority over all the Greeks of the Ottoman Empire, and is also acknowledged as the head of their church by the inhabitants of Austria and the Ionian islands who profess the Greek religion. The other three patriarchs, whose dioceses are filled with Mohammedans, have exceedingly small flocks. The patriarch of Alexandria rules only over two churches at Cairo. Greece has a supreme ecclesiastical council, consisting of three bishops, which is independent of the patriarch of Constantinople in the administration of the external affairs of the church, but acknowledges his authority in matters of faith. The Russian Church, which now constitutes the most important branch of the Greek Church, is noticed in the article on that country.

GREEN, VALENTINE, a celebrated English mezzotint engraver, was born in Warwickshire in 1739. He acquired a great reputation by his prints after West, especially the Return of Regulus to Carthage, Hannibal swearing eternal enmity to the Romans, and the Stoning of St. Stephen. He engraved also many of the pictures of the Düsseldorf Gallery, and several great plates after Rubens, including the Descent from the Cross at Antwerp. He was elected an associate engraver of the Royal Academy in 1774: he died in 1813.

GREENE, ROBERT, was a native of Ipswich. The date of his birth was probably a few years later than 1550. He was educated at St. John's College, Cambridge, where, in 1578, he took his bachelor's degree, and his master's in 1583; and he was incorporated at Oxford in 1588. From about 1584 he was a frequent writer for the press and for the stage; and from some of his pamphlets, which make a half-poetical kind of confessions not unlike those of Byron, a few particulars of his melancholy career may be doubtfully gathered. It thus appears that he married the daughter of a gentleman in Lincolnshire; but that, after she had borne a child to him, he abandoned her for a mistress; and his subsequent life seems to have been spent in alternate fits of reckless debauchery and of the distresses and remorse which his excesses caused. In August 1592, a surfeit at a tavern in London threw him into an illness, which proved fatal. He expired in a state of abject poverty, Sept. 3, 1592.

The name of this unhappy man is very important in the early history of the English drama, and his plays are valuable monuments of this interesting period in dramatic history. In his gayer hours he wrote love-stories and other novels; sketches of society, chiefly in its disreputable walks; and miscellaneous essays: in his moments of remorse he wrote warnings to debauched youth, and ample but exaggerated and romantic confessions of his own follies.

GREENE, MAURICE, Mus. Doc., was the son of the vicar of St. Olave Jewry, London, and born at the latter end of the 17th century. He received his education in St. Paul's choir, under Brind, the organist, and was elected organist of St. Dunstan's in the West before he had completed his 20th year. In 1718 he succeeded his master as organist to St. Paul's Cathedral. On the death of Dr. Croft, in 1726, he was appointed organist and composer to the Chapels Royal, and in 1736 was presented to the office of Master of His Majesty's Band, on the decease of Eccles. The degree of Doctor in Music was conferred on him at Cambridge, his exercise for which was Pope's Ode on St. Cecilia's Day. The university shortly after elected the composer Professor of Music, on the death of Dr. Tudway.

Dr. Greene took an active part in the musical affairs, till, when Handel finally settled in this country, the English musician courted his acquaintance; but, having taken some offence, he soon became one of the great master's bitterest enemies.

In 1750 Dr. Greene came into possession of a good estate in Essex, left him by his paternal uncle, a serjeant-at-law. He died in 1755. He was, as Dr. Burney informs us, in figure much below the common size, and had the misfortune to be

R.B.A.M.S.H.S.M.L. LIBRARY
Block 42
Accession No. 7223
U.D.C No.
Date: 4-2-81

formed; but his address and exterior manners were those of a man of the world, mild, attentive, and well-bred.' Among his compositions are some charming cantatas and songs; but his fame is built on his 'Forty Anthems for one, two, three, four, five, six, seven, and eight Voices,' in two folio volumes.

GREENFINCH, one of the English names for the well-known indigenous Green Linnet, Green Grosbeak, or Green Bird; *Verdier* of the French; *Verdone, Verdero, Antone,* of the Italians; *Grünfinck, Grüner Kernbeiser, Grünling,* of the Germans; and *Groenling* of the Dutch; *Loxia Chloris,* Linn.; *Fringilla Chloris,* Temm.; *Coccothraustes Chloris,* Fleming.

Varieties.—Pure white or yellowish, often variegated with yellow and white. *Locality.*—Common in almost all European countries.

Habits, Food, &c.—Haunts gardens, hedges, orchards, bushy places, rarer in the woods. Food consisting principally of the smaller seeds. Nest in trees (ivied generally), bushes, or hedges; eggs four to six, white, with rusty-red speckles at the larger end. Song not disagreeable; but the bird is valued in confinement more for its extreme docility, and the pretty manner it has of showing its attachment, than for its vocal qualities, though it may be taught to repeat words. Hybrids between the Greenfinch and the hen Canary occasionally occur in aviaries.

GREENHOUSE, a building for growing and protecting those kinds of plants which are too tender to live in the open air. Structures of this kind were formerly erected with slated roofs, like dwelling-houses, and with large upright windows in front, divided and supported by pillars; examples of which may yet be seen in several of the royal gardens about London, and also in different parts of the country. It was soon found that handsome specimens of plants could not be grown in houses of this description, and the only purpose to which they are now applied is the growing of orange or lemon-trees, and protecting other plants in winter. [CONSERVATORY.]

By far the best kinds of greenhouses are those with span-roofs, which should be built in the following manner:—a neat wall, about three feet high, should be built round the front and ends; the back wall should be about two-thirds of the height of the roof. Along the top of the front wall a row of glass sashes, eighteen inches in height, must be placed upon the brickwork, which will raise the front to 4½ feet. The span-roof will then be supported upon this in front, and its back sashes will rest upon the back wall.

A greenhouse should always, if possible, front the south. The best situation is in the flower-garden, but it is sometimes found more convenient to have it joined to the dwelling-house, from which a communication can be made without going out into the open air.

Nothing can be more simple than the arrangement of a greenhouse. In winter the plants should be kept rather dry, particularly if the weather be cold and frosty. It will be found frequently necessary to light a fire even in warm weather, to dry off the damp, which is very injurious to plants at that season of the year; and, if ever any leaves are seen in a mouldy state, they should be instantly picked off and cleaned away, because they would soon infect others, and the whole plant would in a very short time be rendered useless. When a fire is lighted to keep out frost, the temperature should not exceed 45° of Fahr., and if there be no frost, and it is put on to dry off the damp, plenty of air must be given, otherwise the moisture will rise, condense upon the glass, and fall again when the house gets cool.

In summer plenty of air should always be given, and, if the house have ventilators in the front and back, they may be left open during the night as well as the day. When the house is ventilated by sliding sashes on the roof, it is not advisable to leave any of them open during the night, as the plants are liable to be injured by heavy rains. At this season water must be freely given twice every day, and the plants syringed over-head at least every morning. When the atmosphere is very dry, a few pots of water should be thrown upon the passages, which will render it more moist, lower the temperature, and prevent the plants from suffering from excessive heat. If plants are crowded together, they are always unsightly, and can never grow into fine specimens; therefore, where the latter are wanted, plenty of room is indispensable.

Greenhouse plants are generally turned out of doors during the summer months. They should not be placed in a situation too much shaded, but should be sufficiently protected from the intensity of the mid-day sun and from high winds. Here they must be regularly watered and syringed twice every day in dry weather. In the autumn, when the least sign of frost appears, they must be instantly removed into the greenhouse. This will also be the most convenient time for cleaning, top-dressing, and shifting those which require it.

GREENLAND is an extensive country situated between Iceland and the continent of America. Its southern extremity, Cape Farewell, is situated on an island, 59° 49′ N. lat., and 43° 54′ W. long. Its northern districts are buried under masses of eternal ice. The most northern point which has been observed on the eastern coast is Edam Land, 78° N. lat., and 15° W. long. The most northern corner of Baffin's Bay, which washes the western shores of Greenland, is Smith Sound, about 78° N. lat., and 76° W. long. Much of the east coast has not yet been explored.

The whole country may be considered as one enormous mass of rocks. The outline forming the sea-coast is high, rugged, and barren: close to the water's edge it rises into tremendous precipices and lofty mountains, crowned with inaccessible cliffs, which may be seen from the sea at a distance of 60 miles and more. The rocky mass is everywhere covered with eternal snow and ice; and the glaciers thus formed extend in some places down to the sea-shore, where they occasionally fall with a crash into the sea, and form huge icebergs. It is supposed that Greenland is traversed in all its breadth by narrow straits, which divide it into several islands; but all

such straits are at present filled up with masses of ice, except one, which occurs towards the southern extremity, and divides a group of islands from the main land. This strait, called Prince Christian's Sound, is about 100 miles long; but in many places hardly a mile wide. On both sides rise high and bold rocks, and it is only in a few places that there is low beach enough to allow of a boat being hauled up. The currents which set in from the north have often the effect of accumulating the broken ice in long ridges near the coast, so as to render the latter quite unapproachable. The climate is severely cold. July is the only month when there is no snow: it falls in June and recommences in August. The earth begins to thaw in June, but at no great depth ice is always found. The heat in the few but long summer days is so great as to evaporate the water left by the tide among the rocky clefts, and to reduce it to a beautiful fine salt.

The vegetation is scanty. It is composed chiefly of mosses and lichens, and includes a small number of annual plants and a few shrubs, most of which bear edible berries. Sheep are kept, but the difficulty of procuring provender for the long winter limits them to a small number. The chief land animals are dogs, reindeer, hares, foxes, and white bears. Sea-fowl and fish are plentiful.

The low tracts along the coast and the fiords only are inhabited. The inhabitants consist of natives and Danish settlers, the latter amounting to between 200 and 300. The natives are Esquimaux [ESQUIMAUX]: the number of those who have intercourse with Europeans is estimated at about 6000 or 7000, of whom about 600 live on the eastern coast, south 65°.

Greenland was discovered in 981 or 983, by an Icelander or Norwegian, named Gunbiörn, and was soon afterwards colonised by a number of families from Iceland, of whom all historical traces soon disappeared; they appear to have formed their settlement on the western coast. Davis rediscovered Greenland in his voyage, 1585–1587; and in the beginning of the seventeenth century the Danish government fitted out several expeditions to re-establish a communication with the lost colony. In 1721 Hans Egede, a Norwegian pastor, planted a colony at Godthaab (near 64 N. lat.) for the purpose of converting the natives to Christianity. From the year 1733 he was assisted by the Moravian brothers. At present more than 1100 of the natives are stated to be Christians. After the foundation of the colony a regular commerce with the natives was established, which led to the erection of other settlements. These are, from south to north—Julianeshaab (61° N. lat.), with 1400 or 1500 inhabitants; Frederikshaab, Lichtenfels, Godthaab and New Hernhut, Sukkertoppen, Holsteinsborg, Egedesminde, Christianshaab, Jacobshavn, Ritenbenk, Omenak, Uppernavik (72° 48′), and Godhavn, opposite Disco Island, which lies in a bay of the same name. The Danes obtain from these settlements sealskins, fur, eider-down, train-oil, whalebone, and fish.

(Parry; Ross; Scoresby; Crantz; Graah.)

GREENOCK. [RENFREWSHIRE.]

GREENSAND. [CRETACEOUS GROUP.]

GREENSHANK. [SCOLOPACIDÆ.]

GREENSTONE. Rocks in which felspar is combined with hornblende, or less commonly augite, the mixture being evident and the ingredients distinct, are usually called Greenstone. In such rocks the felspar is usually white or greenish, and less completely crystallised than in sienite.

GREENWICH. [KENT.]

GREENWICH OBSERVATORY. The institution of the Royal Observatory at Greenwich originated in the following circumstance. The extension of navigation in the sixteenth and seventeenth centuries made it a matter of great importance to possess the means of accurately determining the longitude of a ship at sea. It was remarked that this could be effected, provided that the motion of the moon among the stars could be exactly predicted before a ship left England. A plan founded on this principle was proposed by a Frenchman, named Le Sieur de St. Pierre, to Charles II. in 1674, who referred it to a commission of official and scientific men, by one of whom (Sir Jonas Moor) the opinion of Flamsteed (already well known as a very learned and enthusiastic astronomer) was taken. Flamsteed however stated that the lunar tables were far too much in error to make this method practicable; and that even the places of the stars in existing catalogues, which must be the foundation for every theory of the motions of the moon or planets, were grievously faulty. Charles II. was much struck with this defect, and measures were taken without delay under his auspices for adopting the cultivation of astronomy as a national object. The Observatory at Greenwich was immediately built, and Flamsteed was appointed Astronomical Observator (the title still retained in official documents) by warrant under the royal sign-manual, with a salary of 100*l.* per annum. The 'finding out the so much desired longitudes of places for the perfecting the art of navigation' was mentioned in this warrant, and also in the warrant for the building, as the reason for instituting the office; and the inscription still existing above the original door of the Observatory declares that it was built for the benefit of astronomy and navigation. No instruments however were supplied by the state: those used by Flamsteed were his own property, and were partly constructed by himself. Flamsteed's residence at the Observatory commenced in July 1676; but his best instruments were not in use till 1689. He died in 1719.

Flamsteed's instruments and his methods of observation were much more accurate than any which had been used. The attachment of telescopes to graduated instruments, and the use of a clock to note the time at which stars and planets passed (by their apparent diurnal motion) across the middle of the field of view of the telescope, were a prodigious advance, not only in the accuracy of observations, but also in the simplicity of their plan. In regard not only to accuracy of observation, and to detail in publication of the methods of observing, but also to steadiness of system followed through many years and to completeness of calculation of the useful results de-

duced from the observations, Flamsteed's 'Historia Cœlestis' may put to shame any other collection of observations in this or any other country.

On the death of Flamsteed, Dr. Halley (the most learned man, and generally the most active philosopher of the age), then in his sixty-fourth year, was appointed to succeed him. No observations however could be made, as the whole of Flamsteed's instruments were taken away. But in 1721 a transit instrument (similar in its motion to those of the present day, though different in form) was mounted, and in 1725 a very large quadrant. These were constructed at the public expense, and are still preserved at the Royal Observatory. An extension of the buildings was necessary for the new instruments. The introduction of the transit instrument, and the superior accuracy of the quadrant, may be considered as an advance in exactitude upon Flamsteed; but the observations were not made with the same order, and were never prepared for printing. Halley confined his observations principally to the moon, adopting Flamsteed's catalogue of stars as the basis of every determination. With the exception of two or three trifling communications to the Royal Society, the whole of Halley's useful labour as astronomer royal is comprised in the comparisons of the moon's place just noticed. He died in 1742.

Bradley, then known as the ablest astronomer of the time, and already famous for his discovery of the aberration of light, succeeded. His other celebrated discovery of the nutation of the earth's axis was not quite completed till he had been a few years at Greenwich. Till the year 1749 he had no other instruments than those used by Halley; the observations made with them have not been printed; nor, so far as we are aware, do any results appear to have been deduced from them. They appear from Professor Rigaud's account ('Miscellaneous Works of Bradley,' p. liii., &c.) to be very numerous. But in 1749 a new transit, a second quadrant, and the zenith-sector formerly used by Bradley, were mounted at Greenwich; and from 1750 begins the series of observations which is properly characteristic of this observatory. With small alteration, the same account will apply to all the observations from 1750 to the present time. Regular observations (without a day's intermission, except from the unavoidable hindrances of weather, &c.) of the principal stars, small stars, the sun, moon, and planets, made with the transit-instrument and clock for the determination of right ascension, and with the quadrants (or, in later years, the circles) for the determination of north polar distances, have been the distinguishing employment of this observatory. Observations have occasionally been made with equatorials or instruments of a similar class, for the determination of the places of comets, &c.; and observations of the times of the eclipses of Jupiter's satellites, the times of occultations of stars by the moon, &c., were sometimes made with detached telescopes, which were incompetent to determine the place of any object in the heavens. But these observations were entirely subordinate to those made with the transit and quadrant; which, from the excellence of the instruments, the care taken in their adjustment, the uniformity in the system of observation, and the extreme regularity with which it has been followed for nearly a century, possess a value to which no other observations have the smallest pretension.

By proper arrangements with regard to the assistants, the interval which elapses between the termination of the observations made under the auspices of one astronomer royal and the commencement of those of his successor has been much diminished. Thus Bradley's last observation was on July 16, 1762, and Bliss's first on August 18, 1762; Bliss's last on March 15, 1765, and Maskelyne's first on May 7, 1765; Maskelyne's last on December 31, 1810, and Pond's first on January 4, 1811; Pond's last on September 30, 1835, and the first under the direction of the present astronomer royal, Mr. Airy, on October 2, 1835. This arrangement has contributed much to distinguish the system of observations pursued at Greenwich from that followed at every other observatory.

Another point which in the last century distinguished this observatory from others, and in which in the present century it has been followed by most modern observatories, is the form in which the observations have been printed. Flamsteed set the example of printing the whole of the observations in a tabular form precisely as they were made, thus giving to any future calculator the power of repeating the whole of the computations by which any result was deduced from them. Maskelyne followed this plan. Bradley's observations, in consequence of a litigation as to the right in the manuscripts, were not printed till the present century, when they were arranged in a similar form; and the same principle is still most scrupulously adhered to. For many years past it has been the practice to publish each year's observations as early as possible in the next year.

Besides regular observations of the sun, moon, and planets, Bradley employed himself on the observation of a great number of small stars. Shortly after the publication of his observations, as mentioned above, the celebrated Prussian astronomer Bessel undertook to deduce from them the places of all the stars observed by Bradley, as well as the obliquity of the ecliptic, the position of the first point of Aries, the law and amount of refraction, &c. This was executed in a work entitled 'Fundamenta Astronomiæ,' &c. (in the preparation of which Bessel was assisted by the English Board of Longitude with a grant of money). This work is universally appealed to as containing the most accurate information as to the state of the heavens and the principal facts of astronomy in the middle of the last century. The number of stars in the catalogue deduced from Bradley's observations is 3222; and the determinations of the whole of these possess very great accuracy.

In the short time during which Bliss resided at the Observatory, observations continued nearly on the same plan as in Bradley's time, the number

of observations of small stars being somewhat diminished.

Maskelyne confined his attention, in a great degree, to thirty-six principal stars. No extended catalogue of stars could be formed from his observations; and in his later years the observation of planets was much neglected. But the sun and moon were observed most regularly; and the exclusive adoption of the principal stars, as above mentioned, gives a greater value (other things being equally favourable) to the determinations deduced from his observations than to those obtained from Bradley's.

Shortly after Pond's accession, a new transit instrument was mounted, and a few years later a mural circle (both constructed by the celebrated Troughton). After the lapse of a few years more, a second mural circle was mounted (made by Jones). Of late years only one circle has been used both for direct and reflected observations. Pond turned his attention, in a great measure, to the verification of the accuracy of the instruments, and of the methods of observing. For some years no extensive catalogue of stars was observed; but the number of observations of the principal stars was immensely multiplied. The results in general possess an accuracy which before was unknown. A catalogue of more than 1000 stars was however produced, comparable or superior in accuracy to any other of the same extent which had yet been published. The observations of the sun and moon were continued in the same incessant manner, and many observations of the planets were also made.

The present astronomer royal, Mr. Airy, has completely reduced and published all the lunar and planetary observations of his predecessors. He has introduced an altitude and azimuth instrument by which observations of the moon out of the meridian can be made which are equal to those made with the transit and circle. A plan is now in progress for mounting a larger object glass than the observatory has hitherto possessed, which is to serve for both kinds of meridian observations.

Another subject, important to navigation, but slightly connected with astronomy, has by degrees been ingrafted on the regular business of the Observatory. In 1822, chronometer-makers were allowed to send a certain number of chronometers each in competition for prizes, to be adjudged after a year's trial; and above sixty chronometers have sometimes been on trial at once, requiring to be carefully rated every day. A similar competition was repeated every year. This system was abandoned in 1836. The manufacture of chronometers appears to have been greatly improved by these trials. Chronometers having been universally introduced into the Royal Navy, the Royal Observatory is made the depôt for them, and while there they are regularly rated: the management of the repairs is also attached to the business of the Observatory.

From the preceding statement it is hoped that the reader may be able to form a general idea of the nature of the astronomical business to which the Royal Observatory of Greenwich is devoted. It is not to the gazing at planets or nebulæ, or to the watching the appearances of the spots in the sun or the mountains in the moon, with which the dilettante astronomer is so much charmed; it is not to the measures of the relative positions and distances of double stars, or the registering the present state of the nebulous bodies which appear liable to change—measures and registers of great importance, but which possess a charm sufficient to persuade private observers to undertake the observations, and which do not demand extreme nicety of adjustment of the instruments, nor require much calculation afterwards. But it is to the regular observation of the sun, moon, planets, and stars (selected according to a previously arranged system), when they pass the meridian and the moon at all hours, at whatever hour of the day or night that may happen, and in no other position; observations which require the most vigilant care in regard to the state of the instruments, and which imply such a mass of calculations afterwards that the observation itself is in comparison a mere trifle. From these are deduced the positions of the various objects with an accuracy that can be obtained in no other way; and they can then be used as bases to which observations by amateur astronomers, with different instruments, can be referred.

In consequence of the continuity, the regularity, and the general excellence of the Greenwich observations of the sun and moon, they have been almost exclusively used in the construction of the theory and tables of the motions of those bodies. Indeed, up to the year 1814 there are no observations, even detached ones, at other observatories, which can be put in competition with the corresponding ones at Greenwich. The observations of planets, so far as they go, have also been used in preference to those of other observatories: indeed for the earlier years there are no others to be found.

The increasing population of London and of the neighbourhood of Greenwich has made it necessary now to place the admission of visitors under very strict rules.

Of late years, a magnetical and a meteorological observatory has been attached to the observatory.

GREGORIAN CALENDAR. [KALENDAR.]

GREGO'RIO, ROSA'RIO, born in 1753. He studied at Palermo, became a priest, and was made a canon of the cathedral of that city. He made himself known by his historical and antiquarian learning. In 1789 he was appointed Professor of Law in the University of Palermo. He was one of the first to suspect the imposture of the Maltese adventurer Vella, who had forged a pretended Arabic diplomatic code of the period of the Saracenic dominion in Sicily, and had succeeded in deceiving some men of learning. Gregorio applied himself to the study of Arabic solely for that purpose. An account of this curious controversy is found in the 'Fundgruben des Orients.' In 1790 Gregorio published a collection of Arabic historical works and documents concerning the history of Sicily: 'Rerum Arabicarum quæ ad Historiam Siculam spectant ampla Collectio,' 1 vol. folio, which he dedicated to King Ferdinand. Gregorio

then undertook to illustrate that of the Aragonese dynasty in Sicily, thus affording a continuation to Caruso's work, which extended through the Norman and Suabian periods, 'Bibliotheca Scriptorum qui Res in Sicilia gestas sub Aragonum Imperio retulere. Eam uti Accessionem ad Historicam Bibliothecam Carusii instruxit, adornavit, atque edidit Rosarius Gregorio, S. Panormitanæ Ecclesiæ Canonicus et Regius Juris publici Siculi Professor,' 2 vols. folio, 1791–2. In 1794 Gregorio published his 'Introduzione allo Studio del Dritto Pubblico Siciliano,' and in 1806 the first volume of his 'Considerazioni sulla Storia di Sicilia dai Tempi Normanni sino ai presenti.' He also wrote 'Discorsi intorno alla Storia di Sicilia.'

Gregorio filled several offices under the government. He was made revisore, or book Censor, judge of the Ecclesiastical Court, and Regio Economo Ecclesiastico, or auditor of church property. But his emoluments continued to be scanty until a short time before his death, when he was presented to the Abbacy of Santa Maria di Roccadia. He died in 1809.

GREGORY THAUMATURGUS, one of the primitive fathers of the church, a native and afterwards bishop of Neo-Cæsarea, in Cappadocia, and a disciple of Origen of Alexandria. He died soon after the council of Antioch, which he attended, A.D. 264. We have of him a 'Metaphrasis in Ecclesiastem,' a 'Brevis Expositio Fidei,' an 'Epistola Canonica,' and a panegyrical oration to his master Origen, on leaving his school.

GREGORY, BISHOP OF NYSSA, in Cappadocia, the brother of Basilius, bishop of Cæsarea, died about 396; he distinguished himself in the Arian controversy.

GREGORY OF NAZIANZUS, one of the fathers of the church, was born in the early part of the fourth century, at Arianzus, a village near the town of Nazianzus in Cappadocia, of which town his father was bishop. He studied at Cæsarea, at Alexandria, and at Athens, where he became the friend and companion of Basilius, who, when made archbishop of Cæsarea, appointed his friend bishop of Zazime, a place which he soon after left to join his father, and assist him in the administration of the church at Nazianzus. He there made himself known for his eloquence and advocacy of peace and conciliation. He had suffered with his brethren from Arian persecution under the reign of Valens, and, after that emperor had taken by violence all the churches of Constantinople from the orthodox, or Nicæans, Gregory came to Constantinople, and took the direction of a private chapel, which he named Anastasia. Theodosius, having triumphed over his enemies, declared himself in favour of the orthodox communion. Gregory, being now recognised as metropolitan, did not retaliate upon the Arians, but endeavoured to reclaim them by mildness and persuasion. In the midst of the pomp of the court, he retained his former habits of simplicity. His conduct soon drew upon him the dislike of the courtiers and of the fanatical zealots. Theodosius convoked a council of all the bishops of the East, which at first acknowledged Gregory as archbishop; but soon after factions arose which disputed his title to the see, and stigmatised his charity towards the now persecuted Arians as lukewarmness in the faith. Gregory, averse to strife, offered his resignation, which the emperor accepted. Having assembled the people and the fathers of the council to the number of 150, in the church of St. Sophia, he delivered his farewell sermon, which is a fine specimen of pulpit eloquence. This oration was delivered in June, A.D. 381, and a few days after Gregory was on his way to Cappadocia. He eventually withdrew to Arianzus, where he spent the latter years of his life, busy in the cultivation of his garden and in writing poetry, a favourite occupation with him from his youth. Gregory died A.D. 389. Most of his poems are religious meditations.

GREGORY OF TOURS, born in 544, of a family of Auvergne, was nephew to Gallus, bishop of Clermont, who took care of his education. He was made bishop of Tours in 573, attended several councils, and distinguished himself by his courage and firmness in denouncing the guilty conduct of Chilperic and Fredegonda, who reigned over France. His boldness exposed him to a sort of persecution, and he retired to Rome, where he died in the year 595. He wrote in Latin a history of France from the first establishment of Christianity till the year of his death. Gregory is the father of the French historians, and the only one who has left us an account of the early Merovingian kings.

GREGORY I., styled the Great, was born in Rome about A.D. 550, distinguished himself for his learning, and was made prefect of that city in 573. He afterwards retired to a monastery, whence he was recalled by Pope Pelagius II., and sent on an embassy to Constantinople to request assistance against the Longobards. On his return to Rome, after the death of Pelagius, in 590, the clergy and people elected him as his successor, notwithstanding his earnest efforts to decline the dignity. He showed great zeal for the reformation of the abuses and corruptions which had crept into the church, as well as for the propagation of Christianity. He zealously supported the mission to England, where the king of Kent and many of the Anglo-Saxons had embraced Christianity. Attracted by the beauty of some Anglo-Saxon children exposed for sale, he had, previous to his elevation, promoted the mission of Augustine to England. Gregory rebuked the archbishop of Constantinople for assuming the title of Universal Patriarch, as being 'full of pride, and inconsistent with the ancient discipline,' while he himself adopted the denomination of 'Servus Servorum Domini' ('servant of the servants of the Lord'), meaning the bishops, an appellation which the popes have retained even since their assumption of universal supremacy. Gregory exercised the jurisdiction of primate of Italy, and gave advice to the other bishops, but not commands. He lived in the most frugal and simple style, was averse to persecution, and considered mildness and persuasion as the only means to bring heretics to Christianity. Gregory wrote numerous works, which have been collected and published by the Benedictines of St. Maur,

4 vols. fol., Paris, 1707. The most important are, 'Moralium, libri xxxiv.,' 'De Cura Sacerdotali,' being a pastoral instruction on the duties of the parochial clergy, and his 'Letters,' in 12 books, which contain some interesting particulars on contemporary history. Gregory died at Rome in 604, and was succeeded by Sabinianus of Volterra.

GREGORY II., III., IV., V., and VI., were little distinguished. For the dates of their accession and reigns see POPE.

GREGORY VII. Hildebrand of Soano, in Tuscany, was of low parentage, and became a monk in the convent of Cluny. Having acquired a reputation for theological and canonical learning, and for strict regularity of conduct, he afterwards went to Rome with Bruno, bishop of Toul, who was elected pope in 1049, under the name of Leo IX., chiefly through Hildebrand's influence. From that time the monk Hildebrand became the mainspring of the Roman hierarchy, and the intimate councillor of Leo, and his successors, Victor II., Stephen IX., Nicholas II., and Alexander II. After the death of Alexander II., 1073, Hildebrand was unanimously elected his successor by the clergy and people of Rome, but he did not assume his title until he had received the approbation of the Emperor Henry IV., who readily confirmed his election, and Hildebrand assumed the name of Gregory VII. The great object of Gregory's ambition was, as he expressed himself in a letter to Hugues, abbot of Cluny, to effect a total reform of the church, which certainly stood in great need of it. Simony prevailed throughout the Christian world, and sees were openly sold or given by sovereigns to their favourites. Gregory determined to remove the evil by taking away from the secular princes the right which they assumed of disposing of the sees within their dominions. The Emperor Henry IV. was one of the most culpable in respect of simony. Gregory began by admonishing Henry; he sent legates to Germany, but to little purpose. His next step was to assemble a council at Rome, A.D. 1074, which anathematised persons guilty of simony, and ordered the deposition of those priests who lived in concubinage, under which name were also included those who lived in a state of matrimony, and it was decreed that no one should be admitted to holy orders unless he made a vow of celibacy. Gregory summoned another council at Rome, A.D. 1075, in which, for the first time, kings and other lay princes were forbidden, under pain of excommunication, from giving the investiture of sees and abbeys by conferring the ring and the crosier. This was the beginning of the quarrel about the investiture which distracted Europe for many years afterwards.

The Emperor Henry IV. paid no regard to Gregory's councils and their decrees, and he continued to nominate not only to German but also Italian bishoprics. But the quarrel of the investiture, which had opened the breach between the Pope and the emperor, was lost sight of in the more extraordinary discussions which followed between them. Gregory had been for some time tampering with Henry's disaffected vassals of Saxony, Thuringia, and other countries, and he now publicly summoned the emperor to Rome to vindicate himself from the charges preferred by his subjects against him. Henry, indignant at this assumption of power, assembled a diet of the empire at Worms, which upon various charges preferred against Gregory deposed him. Upon this, Gregory, in a council assembled at the Lateran Palace, A.D. 1076, solemnly excommunicated Henry, and in the name of St. Peter, prince of the apostles, declared him *ipso facto* deposed from the thrones of Germany and Italy, and his subjects released from their oath of allegiance. This bold act of Gregory produced for a time the effect which he had calculated upon. Most of Henry's subjects, already ripe for rebellion, readily availed themselves of the papal sanction, and a diet was assembled to elect a new emperor. Henry however obtained a delay, and, the matter being referred to the Pope, he set off for Italy in the winter of 1077, and met Gregory at the castle of Canossa, near Reggio in Lombardy, which belonged to the Countess Mathilda, a great friend and supporter of the Pope. Gregory would not see Henry at first, but insisted upon his laying aside all the insignia of royalty and appearing in the garb of a penitent, in a coarse woollen garment and barefooted. In this plight Henry remained for three days from morning till sunset in an outer court of the castle, in very severe weather. On the fourth day he was admitted into Gregory's presence, and on confessing his errors received absolution, but was not restored to his kingdom, the Pope referring him to the general diet. Henry soon after resumed the insignia of royalty, and being supported by his Lombard vassals, and indignant at the humiliating scene of Canossa, recrossed the Alps, fought several battles in Germany, and at last defeated and mortally wounded Rudolf of Suabia, who had been elected emperor in his stead, and was supported by Gregory. Having now retrieved his affairs in Germany, he marched with an army into Italy in 1081, to avenge himself on the Pope, whom he had again deposed in another diet, having appointed Guibert, archbishop of Ravenna, as his successor, under the name of Clement III. Gregory had meantime drawn to his party by timely concessions Robert Guiscard, the Norman conqueror of Apulia and Sicily, who however could not prevent Henry from advancing to the walls of Rome, which he did also in 1082 and 1083 without succeeding in taking it, but on March 21, 1084, the Roman people, who were dissatisfied with the Pope, invited him to enter the city, which he did, and took possession of the Lateran, the bridges, and other important positions. Gregory escaped into the Castle of St. Angelo, and the anti-pope Guibert was publicly consecrated on Palm Sunday, by several bishops. On the following Easter Sunday Henry IV. was crowned by him as emperor in St. Peter's Church. After the ceremony Henry ascended the capitol, and was publicly proclaimed, and acknowledged by the Romans with acclamations. On the approach of Guiscard however, Henry withdrew towards Tuscany, and the Norman and Saracen soldiers, under the pretence of delivering Gregory, who

was still shut up in the Castle St. Angelo, plundered Rome and committed all kinds of atrocities. Gregory, having come out of his stronghold, assembled another council, in which, for the fourth time, he excommunicated Henry and the antipope Guibert; but, not thinking himself safe in Rome, Gregory withdrew to Salerno, where he died in the following year, 1085.

The character of Gregory VII. has not been justly estimated by the generality of historians. He was sincere in his wishes for ecclesiastical reform, and he was himself pure and disinterested; but, in pursuing his favourite and to a certain extent legitimate object, he was led astray by the ambition of exalting his see over all the dignities and powers of the earth, spiritual as well as temporal.

GREGORY VIII. to XVI. [POPE.] Except for their share in political affairs, there is little to record of these popes, but Gregory XIII. was the reformer of the Julian Kalendar, and the reformed Kalendar, called the New Style, has been adopted by all the nations of Europe, except the Russians and Greeks. [KALENDAR.]

GREGORY. A family of this name is unusually distinguished in the history of Scottish science.

James Gregory, the first and most eminent, was son of the minister of Drumoak, in Aberdeenshire, born at Aberdeen in 1638 or 1639, and educated at the university of that town. Before the age of twenty-four, he had invented and published in his 'Optica Promota' a description of the reflecting telescope which bears his name, and still continues in the most general use. At Padua, in 1667, he published his method of expressing circular and hyperbolic areas by means of a converging series, which in the next year he followed by a general method of measuring curved quantities, described by Montucla as a collection of curious and useful theorems for the transformation and quadrature of curvilinear figures, the rectification of curves, the measurement of their solids of revolution, &c. Returning to London about 1668, he was elected F.R.S., and soon after professor of mathematics at St. Andrew's. That office he held until 1674, when he accepted the same chair in Edinburgh. In October, 1675, he was suddenly struck blind, and died within a few days, at the early age of thirty-six.

David Gregory was the son of James Gregory's elder brother David, a remarkable man, skilled in medicine, philosophy, and mathematics, and the first person, it is said, who possessed a barometer in Scotland. (Hutton, 'Math. Dict.') David Gregory was born at Aberdeen in 1661, and there received the early part of his education, which was completed at Edinburgh. At the age of twenty-three he was appointed to the chair of mathematics at Edinburgh. In 1691 he was chosen Savilian professor of astronomy at Oxford, and admitted to the degree of M.D. He died October 10, 1708, leaving unfinished an edition of the 'Conics of Apollonius,' which was completed by Halley.

It is remarkable that himself and two brothers were at the same time mathematical professors in three universities. *James Gregory* succeeded him at Edinburgh in 1691. *Charles Gregory* was appointed mathematical professor at St. Andrew's in 1707, and, resigning in 1739, was succeeded by his son, another David Gregory. Dr. Reid, professor of moral philosophy at Glasgow, was a nephew of these brothers.

Returning to the elder branch of the family: James Gregory, inventor of the telescope, had one son, James, born in 1674, who became professor of medicine in King's College, Aberdeen. He was the father of *James Gregory*, M.D., who succeeded him in his professorship, and of

John Gregory, M.D., born at Aberdeen in 1724, and educated in the schools of that town, until he went to pursue his medical studies at Edinburgh, Leyden, and Paris. He filled successively the chairs of philosophy and medicine at Aberdeen, and that of the practice of physic in Edinburgh, to which last he was appointed in 1766. In 1772 he published his 'Elements of the Practice of Physic,' intended as a text-book for the use of his pupils, which he did not live to complete. His other principal works are 'A Comparative View of the State and Faculties of Man with those of the Animal World,' 1765, and 'A Father's Legacy to his Daughters,' posthumous, 1793. He was found dead in his bed on the 10th of February, 1773, having retired the night before in his usual health.

His son, Dr. James Gregory, became afterwards professor of medicine at Edinburgh, and a leading member of that distinguished school.

It is stated (Chalmers' 'Biog. Dict.,' p. 289) that no less than sixteen members of this family have held British professorships, chiefly in the Scotch universities. (Brewster's 'Ed. Encycl.;' Hutton's 'Phil. and Math. Dict.')

John Gregory was born in Buckinghamshire in 1607, and died in 1647. He was a learned divine of the English Church. *George Gregory*, an English clergyman, born 1754, died 1808, was for many years editor of the 'New Annual Register,' and author of many works, religious, political, and miscellaneous. Neither of them was connected with the Scotch family. For their works and those of other authors of this name, see Watt's 'Bibliotheca Britannica.'

GREGORY, OLINTHUS GILBERT, was born at Yaxley, in Huntingdonshire, January 29, 1774, of humble but respectable parents. At the early age of 19, and not long after leaving school, he published his 'Lessons, Astronomical and Philosophical,' and shortly afterwards he prepared an excellent treatise on the 'Use of the Sliding Rule.' In 1798 Mr. Gregory removed to Cambridge, where he opened a bookseller's shop, at the same time announcing his intention to give instruction in the mathematical sciences; but the encouragement he met with as a preceptor speedily induced him to devote his whole attention to the occupation of a mathematical instructor. His correspondence with the 'Ladies' Diary' commenced whilst he resided at Yaxley, in the year 1794, and he continued to write for that useful periodical during his stay at Cambridge. In 1800 he published his 'Treatise on Astronomy,' which he

dedicated to his friend Dr. Hutton, and about the same period he was appointed editor of the 'Pantalogia.' Soon afterwards he was appointed a mathematical master in the Royal Military Academy at Woolwich; and after the resignation of Dr. Hutton he filled the professor's chair, until obliged, through indisposition, to resign it in June 1838. In 1806 Mr. Gregory published his 'Treatise on Mechanics,' in 3 vols.; and soon afterwards the University of Aberdeen conferred on him the degree of LL.D. In 1823 Dr. Gregory was employed at Woolwich in making experiments to determine the velocity of sound; and, in conjunction with General Millar, in conducting experiments to obtain data for improving the theory of gunnery.

Besides the works which have been mentioned Dr. Gregory published 'A Translation of Haüy's Natural Philosophy' (1807); 'The Pantalogia,' of which he contributed about one-half, in 12 vols. (1808); the third volume of Dr. Hutton's 'Course of Mathematics' (1810); 'Letters on the Evidence of Christianity' (1810); 'Plane and Spherical Trigonometry' (1816). He was appointed editor of the 'Gentleman's Diary' in 1802, and of the 'Ladies' Diary' in 1818. He was a member of almost all the learned societies in Great Britain and on the Continent: he was also one of the twelve gentlemen who founded the Royal Astronomical Society.

Dr. Gregory died Feb. 2, 1841, at Woolwich, regretted by all who knew him.

GREIFSWALDE. [STRALSUND.]

GREITZ. [REUSS.]

GRENADA, one of the Lesser Antilles, lies between 11° 58′ and 12° 20′ N. lat., and between 61° 20′ and 61° 35′ W. long.: its greatest length N. to S. is 25 miles, and its greatest breadth 12 miles. This island was discovered by Columbus on his third voyage in 1498, at which time it was inhabited by Caribs. In 1650 Du Parquet, governor of the island of Martinique, having collected a body of 200 adventurers, landed on Grenada, and formed a settlement. The colonists in a very few months commenced a war of extermination against the Caribs, every one of whom that fell into the hands of the French was murdered. In 1762 the island was surrendered on capitulation to the English, and by the definitive treaty of Paris, signed in February 1763, Grenada was finally ceded to Great Britain. In 1779 the island was taken by the French under Count D'Estaing, but was restored at the general peace in 1783, and since that time has remained in possession of the English.

The island is traversed throughout its whole length from north to south by an irregular range of mountains rising in some places to the height of more than 3000 feet. Several small rivers rise in the high lands. The soil consists principally of a rich black or reddish-coloured mould. In the low ground the heat is often oppressive; but on the hills the atmosphere is cool and pleasant. The island cannot be considered healthy. The population of the island of Grenada, according to the census of 1844, was 25,098.

The town of *St. George* is situated on the south-west side of the island, at the foot of an amphitheatre of hills encircling an extensive bay. It is well-built, and contained in 1844 a population of 4397.

GRENADE, frequently called hand-grenade, is a shell or hollow ball of iron, 2½ inches in diameter, which, being charged with powder and provided with a fuze, is thrown from the parapets into the ditch and covered-way when occupied by the besiegers; or from the covered-way into the trenches, when the latter approach within 25 yards of the crest of the glacis. As soon as the composition in the fuze is consumed, the fire communicates with the powder, and the ball is burst in fragments. Grenades were first used in 1594.

GRENADE-SUR-GARONNE. [GARONNE, HAUTE.]

GRENADIERS are the tallest and strongest men of a battalion; they are embodied in one company, which is disposed at the head of the battalion when in column, and on the right flank when in line.

In France, in the year 1670, a company of men, appointed during a siege to throw grenades into the covered-way of a fortress, and to take the lead in an assault, were attached to each regiment of infantry; and from a list of the commissioned officers of the English army in 1684, it appears that then most of the regiments had grenadier companies. In a work on military discipline (1686) the men of these companies are said to be provided with muskets, swords, pouches to carry grenades, and hatchets: with these last, after firing and throwing their grenades, they were to cut down obstacles in order to enable the troops to rush on the enemy. This duty is now performed by men belonging to the royal corps of Sappers and Miners.

The soldiers in the first of the three regiments of foot-guards are designated Grenadier Guards, and the Scots Greys constitute a regiment of horse-grenadiers.

GRENOBLE (the ancient *Cularo* and *Gratianópolis*), the capital formerly of Dauphiné, now of the French department of Isère, is situated on the Isère just above its junction with the Drac, 345 miles S.E. of Paris, in 45° 11′ N. lat. and 5° 43′ E. long., and has 30,824 inhabitants.

The part of the town on the right bank of the Isère is called St.-Laurent. It consists of one spacious street, which has been lately embellished by the construction of quays along the river; it communicates with the rest of the town by a stone bridge, lately rebuilt, and by an iron chain bridge, the approaches to which are adorned with some handsome modern buildings. Immediately behind this street rises a hill, the lower part of which is called Rabot; higher up, it takes the name of Bastille, from an old feudal castle that once stood on it, and the summit is called Mont Rachel. The greater part of this hill is covered with formidable fortifications, the guns of which can sweep the valleys of the two rivers. The view from Mont Rachel is very picturesque, presenting as in a plan the town and its fortifications, the valley of the Drac on one side, and of the Isère on the other: the view up the Isère is terminated by the snowy mass of Mont Blanc. This part of Grenoble was formerly surrounded by an ancient wall,

which has been demolished within a few years, and is now replaced by a handsome promenade. The quarter of Bonne on the left bank is also fortified, and Grenoble is now considered one of the strongest fortresses in France. This part of the town is extensive; the streets are well laid out; and the houses are good. Among the principal buildings are the office of the prefect; the court house; the town-hall, once the residence of the Constable Lesdiguières; and the building occupied by the College, by the public library of nearly 60,000 volumes, by the museums of Natural History and Antiquities, and by the gallery of paintings. The other remarkable objects are the cathedral of Notre-Dame, the episcopal palace, the hospital, the colossal bronze statue of Bayard, in the Place St.-André, the arsenal, the citadel, the botanic garden, several handsome fountains, the theatre, and the public walks. The town is well lighted with gas.

The chief manufactures of the town are kid gloves, of which about two million francs' worth are exported to England and America annually; liqueurs, chamois and other leather. The dressing of hemp gives employment to about 1000 workmen. The trade of the place is much promoted by the navigation of the Isère; other articles of trade are wrought iron, marble, and timber.

Grenoble is the seat of a bishop, whose see is the department of Isère; of a Cour Royale and University Academy, which have jurisdiction over the departments of Isère, Drôme, and Hautes-Alpes. In connection with the Academy there are two faculties of law and science. The town has also a college, a school of medicine, a school for the artillery, two seminaries for the priesthood, a botanic garden, at which courses of instruction are delivered, and other institutions. Grenoble is the head-quarters of the 7th Military Division, which includes the departments of Isère, Drôme, and Hautes Alpes. It has also tribunals of first instance and of commerce, and an exchange.

Grenoble was the first place which openly received Napoleon on his return from Elba in 1815.

(*Dictionnaire de la France.*)

GRESHAM, SIR THOMAS, was descended of an ancient family of Norfolk. His father, Richard Gresham, was bred to trade, in London, and was a member of the Mercers' Company, and obtained the honours of knighthood and the mayoralty. He died February 20, 1548. Thomas Gresham, his second son, was born in London in 1519, and studied at Gonville (now Caius) College, Cambridge; but was afterwards bound apprentice to his uncle Sir John Gresham, who also belonged to the Mercers' Company. Thomas Gresham took out his freedom in 1543. In 1551 he was employed in negotiating foreign loans by Edward VI. By his advice the experiment of raising money at home rather than from foreigners was first tried by Elizabeth in 1569, and followed with great advantage both to the crown and the nation. He was knighted by Elizabeth in 1559, and was often consulted by her in political and commercial affairs. He built a noble house on the west side of Bishopsgate-street (where the Excise Office now stands), where he was occasionally commissioned by the queen to receive and entertain foreign visitors of high rank. He died suddenly November 21, 1579, leaving no children, except one natural daughter.

In the foundation of the Royal Exchange Sir Thomas Gresham has left a lasting memorial of his wealth and generosity. The original building was destroyed in the great fire of 1666. A view of it may be seen in Ward's 'Lives.' After the fire the Exchange was rebuilt on a larger scale; and with some alterations, of which the chief was the rebuilding of the clock-tower in 1821, it stood till the Royal Exchange was again burnt on Jan. 10, 1838. It has been again rebuilt, and now forms one of the chief architectural features of the city of London.

Sir Thomas Gresham also by his will founded Gresham College, vesting his house in Bishopsgate-street, after the death of his wife, in the corporation of the city of London and the Mercers' Company, in trust to preserve it for the residence of seven skilful teachers: four, of the sciences of divinity, astronomy, music, and geometry, to be appointed by the corporation of the city; three, of law, physic, and rhetoric, to be appointed by the Mercers' Company. A stipend of 50*l.* was made payable to each out of the rents of the Exchange. In the seventeenth century we find eminent names among the lecturers, such as Gunter, Wren, Briggs, Greaves, Barrow, Hooke, Bull, Mus. Doc., Sir William Petty. But in the eighteenth few or no distinguished men appear. The college was sold in 1768 to government for the site of a new Excise-office, and the salaries of the lecturers raised to 100*l.* as compensation for the loss of their lodgings; the restrictions as to marriage were taken off by act of parliament. The lectureships have latterly been restored to somewhat more efficiency, but are yet far from effecting the founder's intentions.

GRESSET, JOHN BAPTISTE LOUIS, born in 1709, at Amiens, studied at a Jesuit's college, and entered their order in the 17th year of his age. He was afterwards sent to Paris, where he completed his studies in the Collège de Louis le Grand. He was only 24 years old when he wrote his celebrated comic poem entitled 'Vert-vert,' which is one of the wittiest productions in the French language. It has been twice translated into English, by T. G. Cooper, London, 1759, and by Alexander Geddes, LL.D., London, 1793. He published soon afterwards 'Le Carême Impromptu' and 'Le Lutrin vivant,' two witty trifles, and also two beautiful epistles entitled 'La Chartreuse,' and 'Les Ombres.' The author was to have been professor at the college of Tours but the sister of an influential minister taking offence at the light tone of Gresset's poetry accused him before his superiors, who, by way of punishment, sent him to La Flèche. Several of his poetic epistles are very well written; but the 'Epître à ma Sœur sur ma Convalescence' may be regarded as a master-piece. Disliking his residence in La Flèche, he requested his superior to remove him to some other place, but on meeting with a refusal he left the order in the 26th year of his age. He now settled at Paris, and in 174

was received a member of the French Academy, but soon afterwards retired to Amiens, where he founded, with the permission of the king, an academy; and having married he settled in the vicinity of the town. Louis XVI. gave him a patent of nobility, and Monsieur, afterwards Louis XVIII., nominated him historiographer of the order of St. Lazarus.

Gresset died at Amiens in 1777. Besides the productions already mentioned he wrote several plays which have not been very successful, except his comedy 'Le Méchant.' In his latter years Gresset became religiously disposed, and destroyed some unpublished plays as well as two new cantos of Vert-vert. The best edition of Gresset's works is that of 'Renouard,' published at Paris, 1811, in three volumes.

GRETNA-GREEN. [DUMFRIESSHIRE.]

GRE'TRY, ANDRE'-ERNEST-MODESTE, was born at Liège in 1741. He showed a taste for music at a very early age; and, after taking part at many musical performances, he went to study composition at Rome, under Casali. While at Rome, Grétry had constant opportunities of hearing the best works of the first masters, which at length inspired him with a wish to try his own powers. An occasion soon presented itself: he was invited by the manager of the Alberti theatre to set a short opera, 'La Vendemiatrice,' which met with success of the most decided kind. He soon afterwards produced his first French opera, 'Isabelle et Gertrude,' at Geneva. He settled finally in Paris, and immediately commenced that brilliant career which, as an artist, scarcely ever suffered the slightest interruption. He was on intimate terms with Voltaire, Marmontel, and other men of talent; and he managed to steer his course through the turbulent scenes of the Revolution without much fluctuation in popularity. He was made a member of the French National Institute, Inspector of the Conservatoire, &c. In private life he was respected, but unfortunate; for his three daughters, forming the whole of his family, fell victims to consumption as they successively reached their fifteenth year. He died in 1813, and was buried with great pomp.

Grétry's operas are too numerous to be all named here. The best known are, 'La Caravane du Caire,' 'Le Tableau Parlant,' 'L'Amitié à l'Epreuve,' 'Zemire et Azor,' 'Les Mariages Samnites,' 'Richard Cœur-de-Lion,' 'Barbe-Bleu,' 'Panurge,' 'Céphale et Procris,' &c. Some of these have been produced on the English stage with great success. In 1780 Grétry published his 'Essai sur la Musique,' in three 8vo. volumes: and in 1793 the republican government printed a second edition of the work.

GREUZE, JEAN BAPTISTE, a celebrated French painter, was born at Tournas in Burgundy in 1726. He was first instructed by Landon at Lyon; also in the Royal Academy at Paris, and later at Rome. He painted but one historical piece—Severus reprimanding his son Caracalla. He was fond of exciting and pathetic scenes. The following are some of his most celebrated pictures: a Father explaining the Bible to his Family; the Blind Man cheated; the Good Mother; the Paralytic Father; the Unnatural Father; the Village Bride; the Huntsman's Return; the Broken Pitcher; the Little Girl and the Dog, by some considered his best picture; la Dame de Charité; le Gâteau des Rois; la Fille Honteuse; la Bonne Education; la Paix du Ménage; la Prière à l'Amour; le Fils Puni, &c., &c., all of which have been engraved. He died March 21, 1805.

GREVILE, SIR FULKE, afterwards LORD BROOKE, was born in 1554. He was the only son of Sir Fulke Grevile, of Beauchamp Court, in Warwickshire; and his mother was a daughter of Ralph Neville, earl of Westmorland. He became a fellow-commoner of Trinity College, Cambridge, but afterwards studied at Oxford. He was appointed to a lucrative office in the Court of the Marches of Wales, but, possessed by the adventurous spirit of the times, he made several attempts to escape into foreign service, which were always defeated by Queen Elizabeth's refusal of leave. Grevile, knighted in 1597, sat repeatedly for his native county in parliament, and continued to receive tokens of the royal favour till the queen's death. King James was equally well disposed, bestowing on him Warwick Castle, which he repaired at a large expense. In 1615 he was appointed under-treasurer and chancellor of the exchequer; and in 1620 he was raised to the peerage by the title of Baron Brooke of Beauchamp Court. Next year, resigning his post in the exchequer, he became a lord of the bed-chamber. Soon afterwards he founded a history lecture in the University of Cambridge, endowing it with a hundred pounds a-year. On the 30th of September, 1628, he had an altercation with an old serving-man, who stabbed him mortally in the back, and then destroyed himself. Lord Brooke was buried in St. Mary's Church, Warwick, under a monument which he had himself erected, with this inscription—'Fulke Grevile, servant to Queen Elizabeth, counsellor to King James, and friend to Sir Philip Sidney. Trophæum Peccati.' He was never married.

Three volumes of his writings, consisting principally of tragedies and poems, were printed after his death. His literary fame, in modern times, has scarcely been equal to his merits. He is more remarkable, however, for power and subtlety of thought than for originality of imagery or for felicity of language.

GRE'WIA, a genus of plants of the natural family of *Tiliaceæ*. Though the family takes its name from the European genus *Tilia*, its species are distributed chiefly through tropical countries. Grewia now consists of upwards of fifty species of moderately sized trees or shrubs, which have leaves resembling those of the elm, yellow or white flowers, and many of them pleasant-tasted subacid fruit.

The *Tiliaceæ* are noted for their mucilaginous properties, as well as for the remarkable tenacity of the inner fibre of their bark, as exemplified in the *Tilia*, or common European Lime Tree: that of *Grewia oppositifolia* is employed for making ropes in the Himalayas; and *G. elastica* is valued for the strength and elasticity of its wood. Cattle are fed on the leaves of some species, as *G. didyma*, at moderate elevations in the Hima-

layas. The pleasant-tasted subacid fruit of several species is eaten by the natives of India, but principally used for making sherbet. *Grewia Asiatica*, or *phalsa*, is that principally employed and cultivated in gardens.

GREY, LADY JANE, born in 1537, was the great-grand-daughter of Henry VII., whose daughter Mary, by her husband, Charles Brandon, duke of Suffolk, had a daughter, Frances Brandon, married to Henry Grey, marquis of Dorset. Of this marriage Lady Jane Grey was the eldest daughter: there was no male issue. She was distinguished from childhood by her talents; and her acquirements were certainly, for her age, very unusual. She spoke and understood several languages, and possessed all the usual female accomplishments. A marriage was concluded between Lady Jane Grey and Northumberland's fourth son, Lord Guildford Dudley, in May 1553; and Edward VI. was persuaded to set aside the rights of his sisters Mary and Elizabeth, and to settle the crown upon Lady Jane Grey, or Dudley. The king died July 6th: the attempt to secure the crown to her utterly failed, and ten days placed Mary in undisputed possession of the throne. Lady Jane and her husband were confined in the Tower in the first instance; but after Wyat's insurrection both were beheaded February 12, 1554.

GREY, CHARLES, second EARL GREY, was born March 13th, 1764, at Fallowden, near Alnwick, in Northumberland. His father, Sir Charles Grey, was raised to the peerage in 1802, for his military services, with the title of Baron Grey de Howick, and in 1806 he was created Earl Grey. He died in November 1807, in his seventy-ninth year.

Charles Grey was sent to Eton, and thence to Cambridge, where he remained about two years, after which he made the tour of France, Spain, and Italy, which occupied him about two years.

Mr. Grey's parliamentary career began in 1786, when he was returned as a member for Northumberland. He attached himself to the party and still more to the person of Mr. Fox. Notwithstanding his youth, and the short time he had been in parliament, he quickly attained a position of considerable eminence, and a high reputation as a speaker, at a time when Fox, Burke, and Sheridan were at the height of their fame as orators.

Mr. Grey now took a prominent part in all the political questions that agitated the country during the disturbed state consequent on the French revolution, both in the House of Commons and out of doors. He was one of the founders and most active members of the society of the Friends of the People, formed for the purpose of obtaining a reform in parliament, and on May 6, 1793, he presented a petition from the Society of the Friends of the People, which elaborately exposed the defects and evils of the existing system of parliamentary representation, and in a striking speech, in which however he did not put forth any plan, he demanded a recurrence to the principles of the constitution. Mr. Grey was defeated, but he continued his exertions on the popular side for many years. In 1797, having been again outvoted on the question of parliamentary reform, he withdrew from the house of commons, or at least did not speak, until 1799, when he opposed the first propositions that were made for the union with Ireland, and he continued his opposition throughout to this measure, but submitted a plan for securing the independence of the Irish members by abolishing forty rotten boroughs in Ireland.

The death of Mr. Pitt, in 1806, led to the formation of a Whig ministry under Lord Grenville. Mr. Grey, now become Lord Howick by his father's elevation, was appointed First Lord of the Admiralty, and Fox held the seals of the Foreign Office. On the death of Fox in September, the office which he had held was filled by Lord Howick, who met parliament in December as leader of the House of Commons. He and Lord Grenville were now at the head of the Whig party. The cabinet was broken up in March 1807; but during its brief existence Lord Howick had carried through the House of Commons the Act for the Abolition of the Slave-Trade.

In November 1807, on the death of his father, Lord Howick became Earl Grey, and he and Lord Grenville were the leaders of the opposition in the House of Lords. One of his first acts as a peer was to protest against the attack upon Copenhagen in the previous year.

After the Prince of Wales became regent, Lords Grey and Grenville were more than once applied to to coalesce with the Tory ministry, but they firmly refused, and they continued in opposition.

On the return of Napoleon from Elba, in 1815, Earl Grey was averse to hastily plunging into another war, and on this occasion he and Lord Grenville took opposite views. Earl Grey took an active part in the trial of Queen Caroline, and in opposing the Bill of Pains and Penalties which had been brought in against her. The Act for the Emancipation of the Roman Catholics, which was passed in 1829, realised one of the great objects of his political life. He gave his support to Mr. Huskisson's measures of commercial reform.

When Mr. Canning became prime minister, early in 1827, Earl Grey dissented from the view taken by most of the leaders of the Whig party, and refused him his support.

Up to 1830 the slightest measure of parliamentary reform had been resolutely denied; but, when the Duke of Wellington's administration was compelled to resign, Earl Grey was sent for by William IV., and requested to form a new cabinet. He announced as prime minister that 'Peace, Retrenchment, and Reform' would be the objects of his policy. On March 1, 1831, Lord John Russell, as the organ of the cabinet, introduced the first Reform Bill into the House of Commons. A brief history of this measure is given under WILLIAM IV. The first Reformed Parliament met on Jan. 29, 1833, and its first measures were the abolition of colonial slavery, the abolition of the East India Company's monopoly, the reform of the Irish church, and the reform of the poor law. The cabinet was early shaken by some personal changes; in July 1834 Earl Grey resigned, and in November the ministry were dismissed.

For one or two years after his retirement from

office Earl Grey occasionally attended the House of Lords, but the last ten years of his life were passed in retirement, surrounded by a numerous family and honoured by the general respect and veneration of his countrymen. He died at his seat, Howick House, in Northumberland, July 17, 1845. The personal appearance of Earl Grey was stately and commanding; his action graceful and animated; and his voice strong, flexible, and sonorous. As a speaker his style was pure and his manner free from affectation. Eight sons and four daughters survived him.

GREYHOUND, a variety of dog remarkable for the keenness of its sight, the symmetrical strength and beauty of its form, and its great swiftness in the chase. There are many varieties of the Greyhound, from the Irish Greyhound and Highland breed to the smooth-haired southern breed, and that pretty pet, the Italian Greyhound. [Dog.]

GREYWACKE. [Grauwacke.]

GRIAS, a genus of plants belonging to the natural order *Myrtaceæ*. There is but one species, *G. cauliflora*, the Anchovy Pear. It is a tall little-branched tree with very long oblong leaves, and large white flowers seated on short many-flowered peduncles. It is a native of subalpine districts of Jamaica in boggy places. The fruit is an ovate berry the size of an alligator's egg, and of a brownish russet colour, and is pickled and eaten in the same way as the mango.

GRIESBACH, JOHANN JACOB, was born at Butzbach in Hesse Darmstadt, on the 4th of January, 1745, and died on the 24th of March, 1812. He commenced his grammatical studies in the Gymnasium at Frankfort-on-the-Main, where his father performed the duties of a Lutheran minister. From Frankfort he went, in 1762, to the university of Tübingen, and afterwards passed two years at the university of Halle, whence he removed to Leipzig. In 1767 he returned to Halle, and applied himself with unwearied diligence to the critical study of philology, moral philosophy, and especially to theological, biblical, and ecclesiastical literature. He now determined to devote himself to a critical examination of the doctrines and of the Greek MS. texts of the New Testament; and in pursuance of this plan he commenced, in 1769, a literary tour, in which he visited England and the principal libraries in Germany, Holland, and France. With a mass of valuable materials, he returned in 1770 to Frankfort, for the purpose of arranging them and applying them to his purpose of producing an amended text of the Christian Scriptures. He was subsequently appointed professor of theology in the university of Jena; and in 1780 he was elected rector of that university. In the performance of his academical duties he was indefatigable. The task of perfecting his edition of the New Testament gave him anxious and laborious employment until nearly the time of his death. At the age of 30 he married Frederica Juliana, a sister of Professor Schütz. The first edition of Griesbach's critical emendation of the text of the New Testament was published at Halle in 1744–5, 8vo., in three successive parts. Some bibliological particulars respecting this, and the several subsequent editions, are given in Mr. Horne's 'Introduction to the Bible.' Of the second edition the first volume appeared in 1796, and the second volume in 1807. This fine impression was made under the careful inspection of Griesbach. The volumes were handsomely reprinted in London in 1809, and in 1818. The copious Latin prolegomena exhibit a critical history of the printed text, a catalogue of all the manuscripts from which the various readings are cited, an account of the author's method of proceeding, and rules for determining the comparative value of various readings. Bishop Marsh, in his 'Divinity Lectures' (part ii., sec. 8), has passed a high eulogium on Griesbach, with regard to this important work, declaring his diligence to be unremitted, his caution extreme, and his erudition profound.

The other works of Griesbach, which are numerous, are nearly all in Latin, and are all more or less directly devoted to the elucidation of biblical subjects.

Griesbach's text has been taken as a standard by numerous other editors. His marginal notes, forming a general and correct index to the great body of collated Greek manuscripts (about 500), are a treasure invaluable to the scholar and necessary to the divine. Every emendation is introduced on quoted authority, and never on mere critical conjecture; and a very important advantage, not previously afforded, is a clear and precise statement of the relative degree of authority for each particular reading. Adopted readings are distinguished by a different type; those rejected are inserted in the margin with appropriate references, and those not admissible into the text, but yet worthy of consideration, are exhibited with indications of their respective claims.

GRIFFITH, WILLIAM, was born in the year 1810, and, having been destined for the medical profession, he completed his education at University College, then called the London University. He distinguished himself in the medical classes, but more especially in that of botany, of which Dr. Lindley was the professor. He went out to India as an assistant-surgeon on the Madras establishment, where he arrived on the 24th of September, 1832. Shortly after his arrival he was appointed by the Bengal government to examine the botany of Tenasserim. In 1835 he and Dr. M'Clelland were selected to accompany Dr. Wallich into Assam for the purpose of reporting upon the growth of the tea-plant. From Assam he proceeded in company with Dr. Bayfield to examine the then unexplored tracts which lie beyond Luddya and Ava, on the extreme frontier of the eastern territories of Great Britain. In 1837 he was appointed to accompany Captain Pemberton on his mission to Bootan. Two years afterwards, in 1839, he was sent with the army of the Indus to examine the character of the vegetation of Afghanistan. During these several journeys he lost no opportunity of making observations and collecting objects in natural history. Although his appointments mostly had regard to his botanical knowledge, his reports, and letters written during his journeys, as well as his papers, show that there was little of interest to the naturalist

that escaped his notice. In his travels he collected both plants and animals. In collecting plants he had the object in view of writing a Flora of India, and to this great work he never ceased to devote himself. Many of his zoological specimens have been sent to Europe, and have been described and published by various naturalists. He devoted much time to the fresh-water fishes of India, of which he made a large collection, and an account of them has been given in the 'Calcutta Journal of Natural History.' At the time of his death his collection of birds consisted of about six hundred specimens, affording perhaps one of the most extensive and instructive illustrations of the geographical distribution of the birds of India extant.

In 1841 Griffith was appointed to the medical duties at Malacca, and, upon Dr. Wallich's absence owing to illness, he was appointed to the superintendence of the Botanical Garden at Calcutta, and the duties of the Professor of Botany in the Medical College. On the return of Dr. Wallich he resumed his place at Malacca, and was there seized with a disease of his liver, which terminated his existence on the 9th of February, 1845.

GRIGNAN. [Drome.]

GRIMALDI, GIOVANNI FRANCESCO, called *Il Bolognese*, a celebrated Bolognese painter, born in 1606, was the pupil and relation of the Carracci. He was particularly excellent in landscape, both as a painter and as an etcher: he etched some of the landscapes of Titian. He painted also history and portrait, and was employed by Louis XIV. and the Cardinal Mazarin for three years at Paris. He was also much employed by Innocent X. He died at Rome in 1680.

GRIMALDI, FRANCESCO MARIA, an Italian philosopher, and a member of the order of Jesuits, was born at Bologna, in 1619. His education being completed, he was employed during several years in giving instruction in the belles-lettres; and during the latter part of his life he applied himself to the study of astronomy and optics. He died at Bologna, in 1663, in the 44th year of his age.

That which has given celebrity to Grimaldi is his work entitled 'Physico-Mathesis de Lumine, Coloribus, et Iride aliisque annexis,' which was published at Bologna, in 4to., in 1665, and contains accounts of numerous experiments relating to the interferences of the rays of light.

Grimaldi, having admitted the sun's light into a dark room, through a small aperture, remarked that the breadth of the shadows of slender objects, as needles and hairs, on a screen, was much greater than it would have been if the rays of light had passed by them in straight lines. He observed also that the circle of light formed on a screen by the rays passing through a very small perforation in a plate of lead was greater than it would be if its magnitude depended solely on the divergency of the rays; and he arrived at the conclusion that the rays of light suffer a change of direction in passing near the edges of objects: this effect he designated 'diffraction.' By Newton it was subsequently called 'inflexion.' He also found that the shadow of a small body was surrounded by three coloured streaks or bands which became narrower as they receded from the centre of the shadow; and, when the light was strong, he perceived similar coloured bands within the shadow: there appeared to be two or more of these, the number increasing in proportion as the shadow was farther from the body.

GRIMM, FRIEDRICH MELCHIOR, BARON, was born at Ratisbon, Dec. 25, 1723, of poor parents, who gave him however an excellent education. Having finished his studies, he published a tragedy called 'Banise,' which was a failure. He afterwards accompanied the young Count Schönburg to Leipzig and to Paris, where he became reader to the Duke of Saxe-Gotha. Grimm was in narrow circumstances when he made the acquaintance of J. J. Rousseau, who introduced him to Baron Holbach, Madame D'Epinay, and other persons distinguished either by their rank or talents. When Paris became divided between the partisans of the French and Italian music, Grimm declared for the latter, and became the leader of the Coin de la Reine, a party so called on account of their assembling in the pit, under the box of the queen, while the opposite party, assembling under the box of the king, was called Coin du Roi. Grimm wrote on the occasion a witty pamphlet, entitled 'Le Petit Prophète de Boemischbroda,' Paris, 1753. His opponents tried to answer him, but were entirely beaten out of the field by another pamphlet entitled 'Lettres sur la Musique Française.' On becoming secretary to Count Friesen, he obtained still easier access to the higher circles of society, where his chief object was to gain the favour of the ladies by the elegance of his conversation, manners, and external appearance. On the death of Count Friesen, he became secretary to the Duke of Orleans, and began also at that time to write for several German princes his literary bulletins, which contained exceedingly clever analyses of all the more important literary productions of France.

In 1776 he was nominated by the Duke of Gotha his minister at the French court with the title of Baron. In 1795 he was nominated by the Empress Catherine of Russia her minister at Hamburg,—a post which he occupied for some time, until a severe illness, by which he lost an eye, compelled him to resign it. He returned to Gotha, where he died Dec. 19, 1807. After his death appeared his 'Correspondence Littéraire, Philosophique, et Critique,' 16 vols., Paris, 1812; another edition with a supplement, by Alexander Barbier, 1814; and a new edition, more complete than either of the preceding, was published at Paris, 1829, in 15 vols.

GRIMSBY. [Lincolnshire.]

GRI'SLEA, a genus of tropical plants of the natural family of *Lythrariæ*, called *Salicariæ* by some botanists. The species are not more than three in number, of which one, *G. secunda*, is found in the warmer parts of South America, and the others in India. *Grislea tomentosa*, the best known and most useful species, is found in the islands of the Indian Ocean, in China, and in every part of the continent of India, especially in the jungly tracts at the foot of its several ranges of mountains. In such situations its bright red

calyx, retaining its colour till the seeds are ripe, gives the whole plant a very showy appearance, and points it out to the collectors of its flowers, which form an article of commerce. These are much employed by the natives of India for dyeing a red colour, and, having some degree of astringency, are also employed in Indian medicine.

GRISONS (*Graubündten*), a canton of Switzerland, is bounded N. by St. Gall, N.E. and E. by the Tyrol, S. by the Valtellina, and W. by the cantons of Ticino, Uri, and Glarus. It is surrounded on every side by lofty mountains, except at one point on the north, through which the Rhine issues, and another on the east by which the Inn escapes from the Valley of Engadin on its way to join the Danube. A large offset of the Lepontian Alps detaches itself from the St.-Gothard, and, running N.E., marks the western boundary of the canton, dividing the waters of the Rhine from those of the Reuss and the Linth; it forms many high summits, covered with perpetual snow. The Rhætian Alps run E. from the St.-Gothard, dividing the feeders of the Rhine from those of the Ticino; the high summits called Piz-val-Rhein (above 10,800 feet), Moschelhorn, and Adula are in this range, over which pass the two roads of the Bernhardin and the Splugen, leading from the Grisons into Italy. E. of the Splugen, at the mountain called Maloya, the chain divides into two; one, continuing along the southern boundary of the Grisons, divides the feeders of the Adda from those of the Inn; and the other, running N.E., forms the watershed between the Inn and the Rhine. [ALPS.] No less than 241 glaciers are reckoned within the limits of the Grisons. The area of the canton is 2962 square miles; its greatest length from E. to W. is about 80 miles, from N. to S. about 55. The population is 84,506. On the frontier of Italy a dialect of Italian is spoken; in the rest of the canton the language is a dialect of German.

The surface is cut into a great number of valleys, the principal of which are the following:—1. The valley of the Vorder-Rhein, which rises at the foot of the Badus, and runs N.E. to Coire. 2. The valley of the Hinter-Rhein, which rises S.E. of the other at the foot of the Piz-Val-Rhein, and, running N. for about 40 miles, joins the Vorder-Rhein, near Reichenau. The Splugen road runs along this valley. 3. The valley of Davos, or of the Albula, another affluent of the Rhine, issuing out of a small lake called Gross-See, near the centre of the canton, and flowing first S.W., and then W., joins the Hinter-Rhein near Tusis. 4. The Prättigau, or valley of the Lanquart, a stream that rises at the foot of the Piz-Linnard, in the chain which bounds the canton on the N., flows N.W. for about 30 miles, and enters the Rhine near Mayenfeld. 5. The valley of Engad-In (head of the Inn), which is the largest valley in Switzerland, next to that of the Valais, is traversed in its whole length about 50 miles by the Inn. It extends longitudinally, and in a N.E. direction between the Lepontian and Rhætian Alps, from the Silser-See whence the Inn springs, to the gorge of Finstermünz, by which it communicates with the Tyrol. This valley, which is divided into Upper and Lower Engadin, is in different parts very narrow, and its greatest width does not exceed two miles. More than twenty transverse valleys open into it. A road traverses its whole length, following the course of the Inn, and along this the villages are built. The climate is very cold; snow hardly disappears in June, and winter begins in September. The pine forests of the mountains, the pastures, and great numbers of cattle are the main sources of wealth. Good cheese is made, and forms an article of export. Some rye, barley, potatoes, hemp, and flax are grown in the lower Engadin. Many of the men emigrate as cooks and confectioners, and some of them who have made money return home and build fine houses, which are conspicuous objects in the villages. The language spoken in the Engadin is called Ladin, and somewhat resembles the Italian. 6. The Münster Thal, a small valley E. of Engadin, the waters of which flow into the Etsch, or Adige. 7. The Val Poschiavo, S. of Mount Bernina, the waters of which run into the Adda. 8. The Val Bregaglia, S. of the Malova and Septimer, through which flows the river Maira, on its way to join the lake of Como. 9. Val Misocco, a considerable valley S. of Mount Bernhardin, through which flows the Moesa, an affluent of the Ticino. 10. Val Calanca, W. of Val Misocco, and the waters of which run into the Moesa. All these principal valleys give access to many smaller transverse valleys, some of them between 5000 and 6000 feet above the sea.

The productions of the soil are extremely varied, according to the elevation of the ground, and the aspect of the respective valleys. Some enjoy almost an Italian climate, and the vine, wheat, maize, the fig, and the almond thrive in them, whilst others produce with difficulty scanty crops of barley and rye. Hemp and flax are cultivated, as well as potatoes, turnips, carrots, and other roots. A considerable part of the canton is occupied by pastures and forests. There are large numbers of cattle, sheep, goats, and pigs, but few horses. Cattle and cheese are exported to Italy. The mountains abound in game; there are also bears, wolves, lynxes, and wild cats. Trout and salmon are found in the rivers.

The principal town of the canton is *Coire*, the ancient *Curia Rhætorum*, in German *Chur*, which stands on the Plessür, about two miles above the junction of that river with the Rhine. It is a double town, consisting of the upper city surrounded by walls, which is the residence of the bishop and canons, and has a seminary, and about 250 inhabitants; and the lower town, which has about 350 houses and 4500 inhabitants, almost all Protestants, some fine public and private buildings, several schools, a library, and a cabinet of natural history. The situation of Coire, on the high road to Italy, renders its transit commerce very active, and several thriving commercial houses are found in it. The canton has no other town of any importance.

The canton is a confederacy of small republics. The origin of the confederacy dates from the beginning of the 15th century, when the chief inhabitants of the valleys of the Upper Rhine, weary of the cruelties and oppressions of their feudal lords,

assembled in a forest near the village of Trons, and there entered into a solemn compact to defend each other's property and persons, and to oblige their lords to respect the same. In May 1424, they all repaired to the village of Trons, and there, under a large maple-tree, swore, in the name of the Holy Trinity, to observe the conditions of the league, which was called the Gray League (Graubund), from their being dressed in gray smock-frocks. Two other leagues were subsequently formed, and the three leagues entered into a federal compact, and also formed an alliance with the Swiss cantons. In 1799 their country was devastated by the French, who drove away the Austrians, and were themselves driven away again by the Russians under Suwarrow. In 1803, the Grisons became a canton of the Helvetic Confederation.

GRIT. Hard sandstones are called grits in the north of England, and indeed many soft sandstones are so termed. In particular districts some distinctive terms are applied, as millstone grit, red grit, white grit, grindstone grit, &c. Almost universally in the north of England the term Freestone belongs to such gritstones as will work easily and to a good face.

In geology, the most remarkable rocks to which the word grit is applied are the calcareous grit (in which however there is often little of calcareous matter), a part of the middle oolite formation, and the millstone grit, which contains beds of quartz pebbles, and is altogether a coarse irregularly laminated rock.

GRITS OR GROATS. [Avena.]

GROCYN, WILLIAM, was born at Bristol, in 1442, and received his early education at Winchester School. He was elected thence to New College, Oxford, in 1467, and in 1479 was presented by the warden and fellows of that society to the rectory of Newton Longueville, in Buckinghamshire. In 1488 he set out upon his travels. His object being to obtain a perfect knowledge of the Greek language, he went into Italy, where he studied under Demetrius Chalcondylas, Poliziano, and Hermolaus Barbarus. On his return to England, he fixed himself in Exeter College, Oxford, in 1491, where he taught the Greek language. The cultivation of this language however in the university alarmed many as a dangerous innovation; and Wood says that the members became divided into two factions, distinguished by the appellations of Greeks and Trojans. It was at this period that Erasmus visited Oxford, and resided during the greater part of his stay there in Grocyn's house. Erasmus mentions him with great and merited commendation. He died at Maidstone in 1519. (Knight's *Life of Erasmus;* Wood's *Athenæ Oxon.*, ed. Bliss. i. 30–32.)

GRODNO, a government of Russia in Europe, lying between 51° 33′ and 54° 21′ N. lat., 22° 49′ and 26° 44′ E. long., is composed of a portion of the grand-duchy of Lithuania and other eastern parts of Poland. It is bounded N. by Vilna, E. by Minsk, S. by Volhynia, and W. by the kingdom of Poland, from which it is separated partially by the Bug, the Narev, the Bobra, and the Niemen. Its area is 13,594 square miles; and its population in 1842 was 907,100. Its greatest length is 200 miles, and its greatest breadth about 140 miles. The surface is a wide plain, and it has numerous forests and marshes. The soil is in general favourable to the cultivation of grain and to the feeding of cattle. The greater part of the province belongs to the basin of the Niemen, which crosses it from N.E. to N.W., describing a vast curve and receiving numerous feeders from both banks. The south-east of the province contains vast swamps, and several lakes; the river Yasiolda, a feeder of the Pripet, one of the principal affluents of the Dnieper, rises in this part. The Oginsky Canal, which joins the Yasiolda, to the lake Vititski, whence issues the Szczara, a navigable feeder of the Niemen, completes the communication between the Dnieper and the Niemen. The south-west of the province belongs to the basin of the Vistula, and is drained by the Bug and its tributaries from the right. [Dnieper; Niemen.] The winter is very cold, and the climate damp and foggy.

Great quantities of barley, rye, oats, hops, hemp, and flax are produced. The crown holds a great number of the forests, which abound chiefly in pine. Horned cattle and sheep are numerous. Much wax and honey are made. The minerals consist of iron, limestone, clay, chalk, and saltpetre.

Grodno is divided into 8 circles. The chief towns are the following:—Grodno.—*Novogrodek*, on a hill above a small feeder of the Niemen, has 2 churches, a synagogue, and 2000 inhabitants. *Slonim*, on the Szczara, has 7 churches, a large woollen manufactory, and 4000 inhabitants, half of whom are Jews. *Brzesc-Litevski*, a walled town, at the efflux of the Mushaviec into the Bug, contains a palace, 12 churches and 2 synagogues, and 11,000 inhabitants, who carry on an extensive trade. This town is the residence of a United-Greek Catholic bishop, and has a much frequented Jewish synagogue. It has been strongly fortified within the last few years.

The manufactures of the province are woollen cloths, hats, leather, paper, and spirits. There is a good export trade in grain, wool, cattle, and timber, with Memel, Riga, and Königsberg.

GRODNO, the capital of the Russian province of Grodno, stands on the right bank of the Niemen, 503 miles S.W. from St.-Petersburgh, in 53° 40′ N. lat., 23° 52′ E. long., and has 16,000 inhabitants, many of whom are Jews. It is the seat of government for the province, and occupies a large extent of ground, but has neither walls nor gates. The palace, erected by Augustus III. king of Poland, is handsome and regularly built, and opposite to the quadrangle in front of it is a fine building containing the government offices. Grodno has 8 Roman Catholic, 2 United-Greek Catholic churches, a Greek church, a Lutheran chapel, and two synagogues. The Greek abbey of St.-Basil is a handsome structure. There are two noble palaces belonging to the Radzivil and Sapieha families, a public library, a high school, a school of medicine, and several other seminaries. The chief manufactures are woollens, silks, hats, cards, and wax. Large fairs are held three times a year. The Polish Diet held here in 179

ratified the second partition of Poland. In 1795 the abdication of Stanislaus Augustus, was signed in Grodno.

GROINS, the lines formed by the intersection of arched vaultings. Such intersections are called 'groinings,' and the vaultings 'groined arches.' The largest groined arches built by the ancients are, we believe, those of the baths of Diocletian, at Rome. Groins, which arose in the first instance out of the simple intersection of arches, were in later times the foundation of an extensive system of decoration. This system is exemplified in the elaborately groined ceilings of many of our ecclesiastical buildings.

Groined arches are constructed of stone, brick, and wood and plaster. When constructed with stone or brick, a centering of wood is used to turn the arch and form its groins. Great nicety is required in the execution of the groined work, and the best workmen among bricklayers and masons are always selected.

GRONINGEN, a province in the kingdom of the Netherlands, bounded N. by the German Ocean, E. by Hanover, S. by the province of Drenthe, and W. by Friesland. Its area is 832 miles, and its population in 1847 was 190,719.

The whole province is a perfect level, intersected every where by canals and ditches, and protected from the sea by dykes. The principal rivers are the Hunze, which is navigable for large vessels from Groningen to its mouth in the Lauwer-Zee; and the Aa, which runs into Dollart Bay. A great proportion of the land is marshy, but rich in pasture, which supports a fine breed of cattle, and a great number of horses and sheep. A great quantity of turf is dug in the eastern part of the province. There are a few unimportant manufactures of woollen cloth, calico, hosiery, linen, and silk. Some of the population are engaged in the fisheries; but the bulk of the people are engaged in husbandry and grazing.

The capital *Groningen*, situated on the Hunze, is a large well-built town with 25,000 inhabitants. It is the most important town in the northern part of the kingdom, nearly circular in its form, and surrounded by walls and a fosse. The great church of St.-Martin, the town-hall, a modern building in the Bree-markt, one of the finest squares in Holland, and the university are the most important structures in the town. There are also a public library, a botanic garden, and an institution for deaf-mutes, founded by Guyot, to whom a monument is erected in the Ossenmarkt. The harbour is good, and a considerable trade is carried on in butter, cheese, rape seed, rape oil, corn, cattle and other agricultural products. The great canal from the Ems to Harlingen, on the western coast of Friesland, passes through Groningen, from which another canal runs N.E. through Appingadam, and terminates at Delfzyl in Dollart's Bay. *Winschoten* is about 17 miles E. from Groningen on the Ems and Harlingen Canal. It is fortified, and has a population of about 2500.

GRONOVIUS, the Latinised form of Gronov, was the name of a family originally from Germany, but settled in Holland, several members of which distinguished themselves by their classical learning.

1. *John Frederic Gronov*, born at Hamburg in 1611, was appointed professor of belles-lettres at Leyden in 1658; he died in 1671. He published editions of several of the classics, such as Livy, Sallust, Seneca, Pliny, &c., and wrote various works on classical learning.

2. *James Gronovius*, elder son of John, was born at Deventer in 1645. He published numerous editions of the Greek and Roman classics, among others of Herodotus, Polybius, Macrobius, Aulus Gellius, Tacitus, &c. But the work by which he is best known is the 'Thesaurus Antiquitatum Græcarum,' 13 vols. fol., Leyden, 1697. He ultimately filled the same chair, as professor in the university of Leyden, which his father had occupied before him. He died at Leyden, in 1716. Niceron, in his 'Mémoires,' has given a list of all his works.

3. *Abraham Gronovius*, eldest son of James, a physician of some reputation, wrote also several works on subjects of classical erudition; he also published a good edition of Justinus, 8vo., Leyden, 1760, adding his own notes to those of his grandfather, J. Fred. Gronovius, and others.

4. *Laurentius Theophilus Gronovius*, younger brother to James, published 'Emendationes Pandectarum juxta Florentinum Exemplar,' Leyden, 1535, which he dedicated to Magliabechi.

GROOM, in old English, meant a servant in some mean station, a lad or lacquey who was sent on errands. At present, in common life, groom means a servant especially attendant on the stable.

In higher life, groom is the denomination of several officers or servants of the royal household, mostly in the lord chamberlain's department: such as grooms in waiting, grooms of the great chamber, grooms of the privy chamber, groom of the robes or stole, and in the lord steward's department, groom of the almonry. There are also three groom-porters among the inferior servants in the present enumeration of Her Majesty's household.

GROS, ANTOINE JEAN, BARON, one of the most distinguished of the recent French painters, was born at Paris in 1771. He was the pupil of David. One of his first works of note was Bonaparte on the bridge of Arcola, exhibited at the Louvre in 1801. In 1804 he exhibited his celebrated large picture of the Plague of Jaffa, with Bonaparte visiting the sick; it is now at Versailles. He painted also several other large pictures, as the Battle of Aboukir; the Battle of the Pyramids; Napoleon visiting the Field of Eylau, after the battle; the Battle of Wagram; the Capture of Madrid by Napoleon; and other subjects from the history of France during the early part of this century. His masterpiece, however, is considered the Cupola of St. Geneviève, at Paris, executed in oil, in 1824, and for which he was created Baron.

He died at Paris, June 26, 1835. He was professor of painting at the Ecole Royale des Beaux Arts; member of the Institute; officer of the Légion d'Honneur; and knight of the order of St. Michel.

GROSBEAK. [HAWFINCH.]

GROSE, FRANCIS, an English antiquary, was the son of Francis Grose, a native of Switzerland,

and was born at Greenford, Middlesex, in 1731. He held the appointment of Richmond Herald, a post which he resigned in 1763, when he became adjutant and paymaster of the Hampshire militia. At a subsequent time he was a captain in the Surrey militia. His father, who died in 1769, left him an independent income, which he had unfortunately neither the disposition to increase nor the prudence to preserve. His losses however roused his latent talents. He published 'Views of Antiquities in England and Wales, Guernsey, Jersey, and Scotland.' In the spring of 1791, he went to Ireland, but soon after his arrival in Dublin he was seized with an apoplectic fit, May 12th, and died immediately. He left behind him several literary works, chiefly on antiquities.

GROSSULA'CEÆ, a natural order of exogenous plants, chiefly remarkable for comprehending the gooseberry and currant of the gardens; and consisting in fact of only one genus, *Ribes*, of which these fruits are different species.

GROTIUS, HUGO, was born at Delft, 10th April, 1583, of which town his father, John de Groot, was burgomaster, and also curator of the then newly established University of Leyden. From his boyhood Grotius manifested an extraordinary ability. At the age of eleven he was sent to the University of Leyden, where his education was particularly superintended by the theologian Junius, with whom he lived, and by Joseph Scaliger. He remained three years at Leyden, during which he applied himself to the study of divinity, law, and mathematics. In 1598 he accompanied a Dutch embassy to Paris. After one year's stay in France, he returned to Holland, whence he addressed a letter to Thuanus (De Thou), expressing his regret at having missed an opportunity of making his acquaintance when in France. This letter laid the foundation of a literary and friendly correspondence, which lasted till the death of Thuanus. On his return from France, Grotius was called to the bar, and pleaded with great success; but his legal occupations did not prevent him from attending to other studies. In the same year, 1599, he published a Latin translation of a nautical work, written by Stevinus, at the request of Prince Maurice of Nassau, for the use of naval officers. In 1600 appeared his edition of the 'Phænomena' of Aratus. Grotius also cultivated poetry with such success, that he was considered one of the best Latin poets of his time.

In 1607 he was nominated advocate-general for the treasury of Holland and Zeeland, and in the next year married Mary Reygersburg, a lady of great family in Zeeland. In 1613 he was made pensionary of Rotterdam, a place which gave him a seat in the assembly of the states of Holland, and afterwards in that of the states-general; and about this time he formed a friendship with Olden Barneveldt. In 1615 Grotius was sent to England in order to arrange the difficulties arising from the claims of the English to exclude the Dutch from the whale-fisheries of Greenland. The most agreeable incident of his visit to England was the opportunity which it gave him of forming an intimate friendship with Isaac Casaubon. The intimacy of Grotius with Barneveldt, whose political and religious opinions he shared, involved him in the misfortune of his friend. [BARNEVELDT; ARMINIUS.] He was condemned, on the 18th May, 1619, to perpetual imprisonment, and his property was confiscated. He was conveyed, on the 6th June, to the fortress of Loevestein, situated at the extremity of an island formed by the Maas and the Waal. His wife was allowed to share her husband's imprisonment. Study was both the consolation and the employment of Grotius during his imprisonment; he wrote his treatise on the truth of the Christian religion in Dutch verse (which he subsequently translated into Latin prose), translated the 'Phœnissæ' of Euripides into Latin verse, wrote the institutions of the laws of Holland in Dutch, and drew up for his daughter Cornelia a kind of catechism in 185 questions and answers, written in Flemish verse. After eighteen months' confinement, Grotius escaped by the contrivance of his wife, on the 21st of March, 1621. He made his way through Antwerp to France, where his wife, who had been detained for about a fortnight in prison, joined him a few months afterwards.

Louis XIII. granted Grotius a pension of 3000 livres, but it was paid with great irregularity. At Paris (1622) he published his 'Apology,' which was prohibited in Holland under severe Penalties. He retired to a country-seat of the president De Mesmes, near Senlis, during the spring and summer of 1623, and here commenced his work 'De Jure Belli et Pacis,' which was published in the next year.

The Stadtholder Maurice dying, and his successor seeming less hostile to Grotius, he was induced by his Dutch friends to return. He arrived at Rotterdam in September 1631, and the news of his return excited a great sensation. But in spite of all the efforts of his friends he was again obliged to leave the country, and went (in 1632) to Hamburg, where he lived till 1634, when he joined the Chancellor Oxenstiern at Frankfort-on-the-Main, who appointed him councillor to the Queen of Sweden, and her ambassador at the court of France. The object of the embassy was to obtain the assistance of France against the emperor. Grotius arrived at Paris in March 1635; and, although he had many difficulties to encounter, he maintained the rights and promoted the interests of his adopted prince with great firmness. He continued in his post till 1644, when he was recalled at his own request. Having obtained a passport through Holland, he landed at Amsterdam (1645), where he was received with great distinction. From Amsterdam he proceeded to Stockholm, where he was received in the most flattering manner by the queen. Grotius however was not pleased with the learned flippancy of Christina's court, and resolved on quitting Sweden. The climate also did not agree with him. The queen made him a present of a large sum of money, and of some costly objects; she also gave him a vessel, in which he embarked for Lübeck on the 12th August, but a violent storm obliged him to land on the 17th, about fifteen leagues from Danzig, whence he proceeded towards Lü-

beck. He arrived at Rostock on the 26th, very ill from the fatigues of the journey; he died on the 28th August, 1645, in the sixty-third year of his age. His last moments were spent in religious preparation. His body was carried to Delft and deposited in the grave of his ancestors, where a monument was erected to him in 1781.

The works of Grotius are very numerous. They treat of divinity, jurisprudence, history, literature, and poetry. Many of them are become classical. His 'Opera Theologica,' which were collected by his son Peter Grotius, 4 vols. 4to., Amsterdam, 1679, contain, in the first volume, his commentaries on the Holy Scriptures, but particularly on the Gospels. Leibnitz preferred Grotius to all the commentators. Among his works on jurisprudence, his treatise 'De Jure Belli et Pacis' is translated into all the European languages. His 'Mare Liberum,' a treatise against the claims of the English to exclusive right over certain seas, was answered by Selden in his 'Mare Clausum.'

His numerous Latin poems, which were collected and published for the first time by his brother William Grotius, at Leyden, in 12 vols., went through ten editions before that of Amsterdam, 1670. Among them are three tragedies. Besides the tragedies he left many poetical compositions in Latin, of the lyrical, elegiac, and epigrammatic kind, as well as many translations from the Greek poets into Latin verse. Grotius wrote some pieces of poetry in Greek, and several Dutch poems, which are much esteemed by his countrymen. His letters have gone through many editions, of which the last is that of Amsterdam, 1809. There is a life of Grotius by Burigny in French; and one by Charles Butler, London, 1826.

GROTIUS, WILLIAM, was born in 1597, at the Hague. He was the younger brother of Hugo Grotius, who directed his studies, and always behaved towards him with the greatest kindness. William Grotius became a learned and prosperous lawyer. He died at the Hague in 1662.

William Grotius collected and published at Leyden, in 1617, the Latin poems of his brother, in 12mo. He himself wrote 'Isagoge ad Praxin Fori Batavici,' Amsterdam, 1655, 4to.; 'Enchiridion de Principiis Juris Naturalis,' Hague, 1667, 4to.; 'Vitæ Jurisconsultorum quorum in Pandectis extant Nomina,' Leyden, 1690, 4to.

GROUND-BASE, in Music, a subject consisting of very few bars, adopted as a base, and continually repeated during the whole movement, while the upper part, or parts, proceed at liberty.

GROUNDSEL. This commonest of annual weeds is the plant called *Senecio vulgaris* by botanists, which was originally a native of Europe and the north of Asia, but which has followed the steps of man in his progress of colonisation, till it has established itself in almost every place where there is a European settlement. It forms one species in the largest genus of plants yet known, no fewer than five hundred and ninety-five others being distinguished by M. De Candolle in his 'Prodromus.' Although in the eyes of man a worthless weed, Groundsel contributes largely to the support of small birds, which feed upon its fruit, or seeds as they are incorrectly called.

GROUSE. [TETRAONIDÆ.]

GRUB, a name applied to the chrysalis or pupa state of insects; it is also sometimes applied to the larva state. [PUPÆ.]

GRUBENHAGEN, a principality which forms part of the Hanoverian province of Hildesheim. Its area is 511 square miles, and it contains about 80,000 inhabitants. The eastern districts, which comprehend the Hartz Mountains, are elevated, and not susceptible of cultivation. The western districts consist of spacious open valleys, which are well cultivated. The mountains are, with very few exceptions, richly wooded: the streams are only mountain brooks. In the lowlands, corn, fruit, hops, tobacco, flax, &c. are raised. Much attention is paid to the rearing of horses, horned cattle, sheep, and swine. Excellent cheese and butter is made. Nearly half the surface is covered with forests, chiefly of pine. Silver, copper, lead, iron, zinc, sulphur, marble, freestone, slate, alabaster, &c. are found. Much charcoal is made. *Eimbeck*, the chief town, stands on the Ilm, and has 5000 inhabitants, a gymnasium, an orphan asylum, and manufactories of woollens, cottons, linens, tobacco, leather, &c. *Osterode*, a walled town, on the Söse, stands at the foot of the Hartz, and has 4500 inhabitants. *Duderstadt*, at the junction of the Brehme and the Hahle, is surrounded by ramparts laid out in walks, and has a population of 4500, who manufacture woollen stuffs, tobacco, tape, ribands, brandy, &c.

GRUIDÆ. [HERONS.]

GRÜNBERG. [LIEGNITZ.]

GRUS, the Crane, a constellation of the southern hemisphere, introduced by Bayer. It is situated between Eridanus and Sagittarius, a little below Piscis Australis.

GRUTER, JOHN, was born at Antwerp, December 3, 1560. His family being Protestant, and driven from Antwerp on account of their religion, he spent his boyhood in England, and studied several years at Cambridge, which he quitted for Leyden at the age of nineteen. His first academic employment was at Wittemberg, as professor of history. In 1602 we find him a professor at Heidelberg, but it is not said in what branch of learning. He himself made a very valuable collection of books, which was lost in the sack of Heidelberg by Tilly in 1622. He continued to reside near Heidelberg until his death, September 20, 1627.

Gruter was more remarkable for industry than for talent. The catalogue of his works in Niceron (v. 9) extends to thirty-two. It includes editions of or notes on Seneca, Statius, Martial, Tacitus, Vell. Paterculus, Florus, Livy, and other writers. His chief work was 'Inscriptiones Antiquæ totius Orbis Romani,' Heidelberg, 1601: a repository of all then known inscriptions. The original work however was superseded by a second edition, by Grævius, Amst., 1707, 4 vols. fol.

GRUYÈRE. [CHEESE.]

GRY'LLIDÆ (*Achetidæ*, Leach), a family of insects belonging to the order *Neuroptera*. Distinguishing characters:—Thighs of posterior legs large; tibiæ armed with spines; abdomen

terminated by two long and slender fleshy appendages; tarsi of the anterior and intermediate pairs of legs three-jointed; antennæ usually long and cetaceous.

The three principal genera contained in this family are *Gryllus*, *Gryllotalpa*, and *Tridactylus*. In the genus *Gryllus* the anterior tarsi are simple; the labial palpi are short; the anal appendages are long and slender, thickest at the base, and pointed at the apex; the elytra in the females are studded with minute nervures which cross each other in an oblique manner; in the males the nervures are less numerous and irregularly disposed: the wings are longer than the elytra, and, when not in use, are folded longitudinally; the females are furnished with a long ovipositor.

Examples.—1. The House Cricket (*Gryllus domesticus*), and the Field Cricket (*G. campestris*). 2. The Mole Cricket (*Gryllotalpa vulgaris*). 3. Several species found in Southern Europe and Northern Africa, living in marshy places, and burrowing in the soil or sand (genus *Tridactylus*).

The genus *Repipteryx* of Mr. Newman ('Entomological Magazine,' vol. ii. p. 204) is closely allied to the last-mentioned insects. The species upon which that entomologist founded the genus is from Para in South America.

(*Hist. Nat. des Insectes*, by MM. Audouin and Brullé, tom. x. p. 192.)

GRYPHÆA, a genus of *Conchifera monomyaria* (Lamarck), closely allied to the oyster, and very abundant in the secondary strata of Europe from the lias upwards to the chalk, but scarcely known in tertiary strata.

GUACHA'RO BIRD (*Steatornis Caripensis*, Humb.). This singular bird, of which specimens exist in the British Museum, was first introduced to science by Baron Humboldt, who in his 'Personal Narrative' gives a lively account of its locality and habits.

It appears, although a berry-feeder, to be allied to the genus *Podargus* (family *Caprimulgidæ*, Goatsuckers or Night-Jars). The characters of the genus, of which this bird forms, as far as known, the only example, are as follows:—Bill hard, horny, much wider than it is high, nearly equalling the head in length; upper mandible strongly bent downwards into a rather sharp hook, and armed near its middle with two small teeth; nostrils linear, longitudinal, nearly closed by a plate placed half way down the mandible; lower mandible rather slender, dilated at its base; gape considerable, and extending to the posterior part of the eye; base of the bill furnished with stiff hairs directed forwards; feet short, weak, with four toes separated up to their base; claws arched and weak, not dentilated; fourth quill longest.

The Guacharo Bird is thus described by Humboldt. Size of a common fowl; plumage sombre, brownish gray, mixed with small striæ and black dots; large white heart-shaped spots bordered with black on the plumage of the head and on the wing and tail feathers. The plumage of the back is without spots. Tail wedge-shaped.

It was in the deep and romantic cavern which gives celebrity to the valley of Caripe in Cumana that Humboldt met with this strange bird. This cavern is said to be several leagues in length, and has been for ages known to the natives as the home of this bird. Hence the name of the cavern the *Cueva del Guacharo* (which is in 10° 10′ N lat., and consequently in the centre of the northern half of the torrid zone).

The *Cueva del Guacharo* is pierced in the vertical profile of a rock, and the entrance is towards the south, forming a vault eighty feet broad and seventy-two feet high. The rock which surmounts the cavern was covered with trees of gigantic height, and all the luxuriant profusion of an intertropical vegetation. Our space prevents an enumeration of the beautiful and curious plants, among which the *orchideæ* are not forgotten, recorded by the Baron, and dwelt on by him with a pardonable rapture; but it is worthy of observation, that this luxuriance penetrated even into the vestibule of the cave. The travellers saw with astonishment plantain-leaved heliconias eighteen feet in height, the praga palm, and tree arums, follow the banks of the river even to the subterranean places. There the vegetation continues, as in the deep crevices of the Andes, half shut out from the light of day, nor does it disappear till a distance of thirty or forty paces from the entrance. The party went forward for about four hundred and thirty feet without being obliged to light their torches. Where the light began to fail they heard from afar the hoarse cries of the Guacharo Birds. These birds quit the cavern only at nightfall, especially when there is moonlight; and Humboldt remarks that it is almost the only frugivorous nocturnal bird yet known. It feeds on very hard fruits, and the Indians assured him that it does not pursue either the lamellicorn insects or those *phalænæ* which serve as food to the goatsuckers. He states that it is difficult to form an idea of the horrible noise made by thousands of these birds in the dark recesses of the cavern, whence their shrill and piercing cries strike upon the vaulted rocks and are repeated by the echo in the depths of the grotto. By fixing torches of copal to the end of a long pole, the Indians showed the nests of these birds fifty or sixty feet above the heads of the explorers, in funnel-shaped holes, with which the cavern-roof is pierced like a sieve.

Once a year, near midsummer, the Guacharo cavern is entered by the Indians, armed with poles for the destruction of all the young birds within reach. From the inside of these birds a very pure and delicate oil is procured by melting the fat in clay pots over a brushwood fire. In the kitchen of the monks of the Convent of Caripe no other oil is used. It will keep above a year without becoming rancid. It appears that there are neighbouring caverns, too narrow to be accessible to man, inhabited by colonies of Guacharo Birds; and it is from these perhaps that the annual loss of numbers in the great cavern is supplied. Be this as it may, the missionaries assured Humboldt that no sensible diminution of the birds had been observed; yet the annual carnage is enormous, and has been so for ages, the use of Guacharo-oil being very ancient. Superstitious fears prevent the natives from proceeding far into the recesses of the Cavern of Caripe. Hence, though thousands of

young birds are destroyed, thousands escape, which is another circumstance tending to the preservation of this extraordinary species.

GUADALAJARA. [Castilla-la-Nueva.]

GUADALA'JARA, the capital of the republic of Xalisco, in Mexico, is situated on the river Santiago, about 21° N. lat., 104° W. long., and has 80,000 inhabitants. The town is well built, the streets are straight, wide, airy, and many of the houses excellent. There are fourteen squares, several large convents and churches. The cathedral, the churches and convents of San-Francesco and Sant-Augustin, the university buildings, the ecclesiastical seminary, and the mint are among its finest buildings. The portales, or colonnades, may be called the bazaar of the town, being filled with handsome shops, well stocked with goods. The Alameda, or public walk, is well laid out; it has a fountain in the centre, and a stream of water all round. The inhabitants are industrious, and carry on various trades. They are noted for their skill in working leather, and in manufacturing a porous earthenware, with which they supply the neighbouring states. Shawls of striped calico are also made in considerable quantities. The city is supplied with water from numerous fountains, which are fed by an aqueduct 14 miles long.

GUADALAVIAR. [Spain; Valencia.]

GUADALOUPE, one of the Lesser Antilles, belonging to France, lies about the point 16° 20′ N. lat., 62° W. long. It is divided into two parts by a channel varying from 30 to 70 yards in breadth, and called La Rivière Salée, or Salt River, which runs from N. to S., and has a large bay at each end. Its depth is so unequal that only vessels of small burthen can pass through it. The land E. of this channel is called *Grande Terre*, while that on the W. is called *Basse Terre*. The entire length of the island is from 60 to 70 miles, and its greatest breadth is 25 miles. The population is about 130,000, three-fourths of whom are slaves.

The island is apparently of volcanic origin. In the western division there is a mountain about 5500 feet high, called La Souffrière, or the Sulphur Hill, from which a thick black smoke rises, and which is sometimes an active volcano. It forms part of a ridge which extends through the western division, and gives rise to several streams. Grande Terre is more level than the western side, but has no streams or springs, and the soil is less fertile. Sugar, molasses, rum, coffee, cotton, and cocoa are the chief products.

The chief towns are—*Basse Terre*, which stands in the division of Basse Terre, in 15° 59′ N. lat., 61° 47′ W. long., and has 12,000 inhabitants; it is the seat of the governor of the island, and has a Cour Royale, and a tribunal of first instance; the harbour is unsheltered, and has but indifferent anchorage: and *Pointe-a-Pitre*, at the south entrance of the Rivière Salée, which has a good harbour, and, including the environs, 15,000 inhabitants; this town was almost entirely destroyed by an earthquake in 1843, but it is still the most commercial place in the island.

GUADALQUIVIR. [Andalucia; Spain.]

GUADARRAMA. [Castilla-la-Nueva; Castilla-la-Vieja.]

GUADIANA. [Castilla-la-Nueva; Estremadura; Spain.]

GUAIACUM, a genus of small crooked trees, inhabiting several of the West India Islands, in low places near the sea, and belonging to the natural order *Zygophyllaceæ*. The most remarkable species is *G. officinale*, from which the hard, compact, black-green wood called Lignum Vitæ is obtained, which is so heavy that it sinks in water, and from which pestles, ship-blocks, rollers, castors, &c. are turned. This plant grows about twelve feet high, with round knotty branches. It produces the gum-resin known in medicine under the name of Guaiacum.

Guaiacum officinale is a native of the West Indies. For medicinal purposes, the wood should be procured from the central part of the trunk, as being the richest in the active principle. This wood is very dense, heavier than water, of an obscure greenish fawn colour; but the recent fracture is yellowish, exhibiting an unequal cleavage, with a fatty shining appearance, if the specimen be good. The wood of the circumference is lighter, both in colour and weight, pale fawn, and opake. In Guiana the wood of the *Dépterix odorata* (Tonka Bean) is used under the name of guaiac-wood, which it greatly resembles; hence probably the statement of some writers, that the Guaiac-tree is a native of America.

Genuine guaiac-wood is destitute of smell, but if rubbed, and still more if set on fire, it evolves an agreeable aromatic odour. If long chewed, the taste is peculiar, guttural, and bitterish. The wood is less used than the resin. Guaiac-resin exudes spontaneously, or in consequence of incisions, and hardens on the bark. Resin obtained in this way is generally in spherical or long tear-shaped pieces.

Guaiac possesses the property of stimulating the system generally, causing increased vascular action, augmented heat of the body, and promotes the secretions of the skin and lungs; but in large doses it produces nausea, anxiety, abdominal pains, and stupor. It is not prized now so highly as on its introduction into European practice in the sixteenth century, when it bore a most extravagant price, four ducats being often given for a pound of the wood. It is however a useful agent in certain forms and stages of gout and rheumatism, and in some cutaneous diseases, especially when, in the first set of disorders, it is combined with ammonia, and in the latter with mercurials and diaphoretics or antimonials.

Its insolubility in watery menstrua is an obstacle to its easy administration, and even its alcoholic solutions are precipitated on the addition of water. It is generally made into an emulsion, or given in pills; but a soap may be formed by means of heated aqua potassæ, in which the resin is to be dissolved, then evaporated, and a soft consistent mass is obtained, which may be formed into pills or a bolus.

GUANACO. [Llama.]

GUANAXUATO. [Mexican States.]

GUANAXUATO, the capital of Guanaxuato,

one of the United States of Mexico, is situated on the table-land of Anahuac, near 21° N. lat. 101° W. long., at an elevation of 6835 feet above the level of the sea, and on extremely uneven ground, furrowed by numerous ravines. The town, which owes its origin altogether to the gold and silver mines which surround it, is very irregularly built. Many of the streets are very steep. It contains numerous splendid memorials of the former rich produce of the surrounding mines, in the magnificent palaces of the proprietors, in the church which formerly belonged to the Jesuits, in the numerous chapels and religious edifices, and in the road which leads to the mine of Valenciana, which had attained the depth of 1686 feet in 1803. The Alhondiga, a large square building used as a public granary, is a solid edifice. Before the War of Independence, the town contained a population of 41,000, and its six suburbs nearly 30,000 more; but most of the works for keeping the mines clear of water were neglected or destroyed during the civil war, and the annual produce, in spite of the great sums expended for their re-establishment, still falls far short of what it was formerly. The mines lie in different directions round the town: from 1766 to 1820, they produced not less than 225,935,736 Spanish dollars.

GUANO (from the Peruvian word *huanu*, which signifies dung) is the excrement of sea-fowl, and appears to have been used as a manure long before Peru was visited by the Spaniards. It is spoken of by Herrera in a work published at Madrid in 1601; by Garcilaso de la Vega in his 'Memoriales Reales,' published at Lisbon in 1609; and by Ulloa in his 'Voyage.' A recent German traveller, Meyer, in his 'Reise um die Welt,' says, 'Along almost the whole coast of Peru this excrementitious matter covers the small islands and cliffs near the coast, and on some spots lies in such enormous beds as could only be produced by the accumulation of thousands of years.' About the commencement of 1843 guano was discovered on the island of Ichaboe, about two miles and a half from the main land of Africa, in 26° 13′ S. lat., and 14° 15′ E. long. The place soon attracted notice, and by the end of 1844 the whole of the guano had been carried away. As many as 350 ships have been anchored off the island at the same time. The guano was from 35 to 38 feet in depth, and the deposit extended to a length of about 1100 feet, with an average width of 400 feet. Towards the close of 1844 another guano island (Malagas) was discovered at the entrance of Saldanha Bay. The guano covers an extent of about eight miles, and the thickness is from about four yards to eight yards. It has been supposed that the excrement of the sea-fowl which swarm on some parts of the coast of Great Britain might be used as a fertiliser with the same results as Peruvian or African guano; but the quantity which could be collected is comparatively small, as the animal accumulation is in most cases washed away by the rains, and the valuable properties of that which remains are dissipated by the changeable nature of our climate.

The value of guano is to be estimated according to the proportions which it contains of—1, ammonia; 2, phosphates; 3, organic matter. African guano has the largest proportion of soluble matter, and that from Peru is remarkable for the quantity of uric acid that it contains, an element which dissolves very slowly. African guano may therefore act with greater rapidity, but the effect of Peruvian guano is felt for a longer period.

It is said that 4 cwts. of guano, which is the usual quantity applied to one acre, are equal in effect to fifteen tons of farm-yard dung. In the application of guano, care should be taken to prevent its coming in contact with the seed. The guano must be mixed with three times its bulk of finely pulverised earth, burnt clay, mineral ashes, &c.; but for cold soils the proportion of guano may be increased, and the quantity to be applied per acre may vary from two to four cwts., according to the nature and quality of the soil. It is best when rain follows the application of guano within a short time, and a wet season is generally considered most favourable to its success. For small allotments or gardens it is often most convenient to use guano in a liquid state, in which case 4 lbs. of guano may be mixed with twelve gallons of water, and used after it has stood twelve hours, and the proportion per acre may be from a half to one cwt. of guano to 160 gallons of water.

GUARDIAN, one who has the care of a person and his property. Guardians are appointed only to infants. The law of England indeed provides guardians for idiots and lunatics, but the rules relating to them will be more conveniently considered under LUNATIC. In the Roman system the terms Tutor and Curator correspond in some degree to the English Guardian. [CURATOR.]

The usual division of guardians is:—1. Guardians by the common law. 2. Guardians by custom. 3. Guardians by statute.

I. *Guardians by the Common Law* were of four kinds; guardians in chivalry, in socage, by nature, and for nurture.

1. *Guardianship in Chivalry* is now abolished by the Stat. 12 Car. II. c. 24, which abolished the onerous portions of the feudal system. This guardianship, being considered more an interest in the guardian than a trust for the ward, was saleable, and, if not disposed of, passed at the lord's death to his personal representatives.

2. *Guardian in Socage.*—This also is a consequence of tenure, and takes place only where lands of socage-tenure descend upon an infant under the age of fourteen. Upon attaining that age, the guardianship in socage ends, and the infant may appoint his own guardian. The title to his guardianship is in such of the infant's next of blood as cannot have the estate by descent in respect of which the guardianship arises. The guardian in socage is entitled not only to the custody of the person and socage estates of the infant, but also to his hereditaments not lying in tenure, and even his copyhold estates, where no custom to the contrary exists in the manor of which they are held, and also his personal property. The guardianship in socage is not saleable or transmissible, but on the death of the guardian the wardship devolves on the person next in degree of kindred to

the infant, who cannot be his heir, and the guardian is accountable to the infant for the profits of his estate.

3. *Guardian by Nature.*—This species of guardianship has no connection with tenure. It extends only to the custody of the infant's person, and lasts till he attains twenty-one. Any ancestor of the infant may be such a guardian, the first right being in the father, the next in the mother, and, if they be dead, the ancestor to whom the infant is heir has a right to the custody of his person. Until fourteen, it seems the guardian in socage is entitled to the custody of the person, and after that age the guardian by nature.

4. *Guardians for Nurture* are the father and mother of the infant. Both these last descriptions of guardianship are also superseded by the appointment of a guardian by statute.

Where an infant is without a guardian, the Court of Chancery has power to appoint one; and this jurisdiction seems to have vested in the king, in his Court of Chancery, upon the abolition of the Court of Wards. Where a proper case exists for the jurisdiction of this court, it will interfere not only with the property of the infant, but also with the custody of his person, and will, in case of any misbehaviour, remove a guardian, however he may have been appointed or constituted, and will appoint a proper guardian to the infant in his room. There was an instance of this jurisdiction in the case of the Duke of Beaufort *v.* Wellesley —where Lord Eldon deprived a father of the custody of his children, as not being a fit person to have the charge of them. All courts have power to appoint a guardian to defend a prosecution or suit instituted by or against an infant. (Co. Litt., 88, b. Hargr. note.)

II. *Guardians by Custom.*—By the custom of the city of London the guardianship of orphans under age and unmarried belongs to the city; and in many manors particular customs exist relating to the guardianship of infants.

III. *Guardians by Statute.*—Guardians by statute are now appointed by virtue of 12 Ch. II. c. 24. Under this statute, fathers, whether under age or of full age, may, by deed or will attested by two witnesses, appoint any person or persons (except Popish recusants) guardians of their unmarried children until they attain twenty-one, or for any less period. But by 1 Vict. c. 26, §§ 7, 8, no will made by a person under twenty-one years of age is valid.

A guardian appointed under this statute supersedes all other guardians, except those by the custom of London, or any city or corporate town in favour of which an exception is made, and is entitled to the custody of the infant's person and his property. If two or more persons are appointed guardians under the provisions of this statute, the guardianship remains to the survivor.

The words guardian and warden are of the same signification: indeed they were formerly used indifferently. Thus the Warden of the Cinque Ports was styled Guardian, or, in the old French, Gardeyn, and Churchwardens were styled Gardeyns del Eglise.

GUARI'NI, GIOVANNI BATTISTA, was born at Ferrara in 1537, of a family which had produced several distinguished men of letters. After receiving a careful education he was taken into the service of Alfonso II., duke of Ferrara, who sent him on several missions as his ambassador. In 1582 Guarini left the court, and retired to his villa near Rovigo. After four years he was recalled by Alfonso, who appointed him secretary of state; but Guarini soon after resigned again, and passed into the service first of the Duke of Savoy, and afterwards of Vincenzo Gonzaga, duke of Mantua. In 1591 he was once more recalled to Ferrara. In 1592, Alfonso having died, Guarini offered his services to Ferdinand de' Medici, grand-duke of Tuscany, by whom they were readily accepted; but, having some time after quarrelled with him also, he passed into the court of Francesco Maria, duke of Urbino. Becoming dissatisfied here also, he left the duke of Urbino, and went to Rome, Ferrara, and lastly Venice, where he died in October 1612. He often complained of the trammels, jealousies, and ingratitude of courts, and yet could not live away from them. Guarini wrote poetry of various kinds: the most celebrated of his compositions is his 'Pastor Fido' (the faithful swain), a pastoral drama. He wrote also a number of madrigals, and other specimens of lyric poetry. His works were collected and published in 4 vols. 4to., Venice, 1737.

GUASTALLA. [Parma.]

GUATEMA'LA *la Nueva*, the capital of Central America, is situated in 14° 37′ N. lat., 90° 30′ W. long., on a plain, which is about 14 miles long, 9 wide, and 4961 feet above the sea-level; it is 120 miles from the Atlantic and 50 from the Pacific. Population 50,000. It is built with great regularity; the streets are straight, and cross one another at right angles. They are 40 feet wide, and always terminate in some conspicuous building. The streets are well paved, and slope from each side towards the middle, where a stream of water runs. The houses have only one story, but occupy a great deal of ground, containing within their walls one, two, or even three courtyards, which have a basin full of water in the middle, and are surrounded by a portico of wooden columns, under which is the entrance to the rooms: the roofs are flat. The town is well provided with water brought by an aqueduct from a spring about 4 miles distant. The most remarkable buildings are round the market-place, which is situated nearly in the centre of the town. On three sides of it are projecting piazzas, which form a covered walk, under which various articles are exposed to sale. On the east side stands the cathedral, a simple but noble building, and near it on one side the palace of the archbishop, and on the other the university. Besides the cathedral there are 4 parish and 15 other churches. The town is the seat of an archbishop and of the government authorities; it has a university, two colleges, an economical society, which publishes its transactions monthly, a public library, and several other literary and scientific institutions. Guatemala enjoys a perpetual spring. The thermometer rarely rises above 80°, and still more rarely descends below 60°. Earthquakes are frequent. The

commerce is limited to the consumption of the town and neighbourhood. Its manufactures do not extend beyond the common wants of life. The suburbs are mostly inhabited by natives or mulattoes.

Guatemala la Antigua (Old Guatemala), which is about 26 miles W.S.W. of the capital, is situated in a wide valley of great fertility, at the western end of which rise the two volcanoes of De Agua and De Fuego, each about 13,000 feet high. The town itself is at an elevation of 5817 feet. After its partial destruction in 1773, and the foundation of New Guatemala, the Spanish government ordered the place to be abandoned. But, as a considerable portion of the town had not suffered by the earthquake, people still returned to it, and the population is now 18,000. Among the buildings which have not been destroyed is the town-hall, a magnificent edifice, and a sample of the style in which the place was built. [CENTRAL AMERICA.]

GUAYANA. [GUYANA.]

GUAYAQU'IL, the capital of the department of Guayaquil, in the republic of Ecuador, in South America, is situated in 2° 12′ 12″ S. lat., 79° 39′ 46″ W. long., on the river Guayaquil, which is about two miles wide opposite the town, and enters the sea 40 miles below it, near the island of Puna. Population 25,000. Vessels of considerable burden can sail up to the town, as the tide at full and change rises 24 feet. The town is built on the northern side of the river, on a low ground devoid of drainage; in the rainy season it is very unhealthy, malignant fevers being then (from December to April) very prevalent. The whole town extends about two miles along the river, but its breadth is inconsiderable. The houses have commonly one story, and the framework is made of strong timbers, in order to resist the shocks of earthquakes, which are often experienced here. In the principal street, the Calle de Comercio, however, almost all the houses are two stories high; the ground-floors being divided into small shops and occupied by artisans of different trades. None of the public buildings are distinguished by architectural beauty. Several large balzas are constantly employed to bring fresh water down the river from a distant place. There are few spots, even between the tropics, which for richness and vigour of vegetation can vie with the wide valley traversed by the river of Guayaquil. European goods, chiefly fine cottons, woollens, silks, and liquors, are imported into Guayaquil in considerable quantities, and sent up the river to Caracol, whence they are carried on the backs of mules to Quito. The value of the exports (chiefly cacao and cotton) in 1843, 1844, respectively, was 247,432*l.*, and 196,194*l.*; the value of the imports for the same years was 218,263*l.*, and 209,103*l.* [ECUADOR.]

GUBBIO. [ROMAN SCHOOL OF PAINTING.]

GUBEN. [BRANDENBURG.]

GUDGEON, a small fish common in many of the rivers and other running streams of this country, and also in most other parts of Europe. It is generally about five or six inches in length. The upper parts of the head and body are of an olive-brown colour spotted with black, and the under parts are white. The dorsal fin and the tail are brownish, and spotted with a deeper colour.

The gudgeon belongs to the family *Cyprinidæ*, and genus *Gobio*, which latter differs chiefly from the genus *Barbus* (the barbels) in having no strong bony ray at the commencement of either the dorsal or anal fins. Like the barbels, the gudgeons have both the dorsal and anal fins short, and are furnished with barbules, or cirri, about the mouth.

GUELDERLAND, or GELDERLAND, a province of the kingdom of Holland, lying between 51° 45′ and 52° 32′ N. lat., 4° 57′ and 6° 47′ E. long., is bounded N. by the Zuider-Zee and Overyssel, W. by Utrecht and South Holland, S. by North Brabant, and E. by the Prussian Rhein-Provinz. Its area is 1962 square miles, and the population in 1847 was 373,383. The surface is in general level, but not so flat or low as the adjoining maritime provinces, and the climate is healthy; the soil is good and the pasture luxuriant; but there is a considerable quantity of heath and barren land, some of which is planted with firs, pines, and oak. Guelderland is watered by the Rhine, the Waal, the Yssel, the Maas, and the Leck, besides which rivers there are several canals. It is crossed by the Amsterdam and Arnheim railroad. Wheat, rye, buck-wheat, potatoes, hops, and tobacco are the principal crops. Orchards are very numerous. Some few manufactures are carried on; among these, paper-making and tanning are the principal.

The capital of the province is ARNHEIM.

Nimeguen or *Nymegen*, the Roman *Noviomagus*, stands on the left bank of the Waal, and has 17,500 inhabitants. It is built on the slope of a hill, and strongly fortified. The town is well built, but the streets are narrow. The quay is separated from the town by a wall. The most remarkable buildings are the town-house and the church of St. Stephen. Some Roman antiquities have been discovered. On an eminence above the town is the fine café and promenade of the Belvedere, from which there is a very interesting prospect. Leather, glue, and white beer, called moll, are the chief industrial products. Nymegen is famous for the treaties of peace concluded here Aug. 10, 1678, between Spain, France, and Holland; and Feb. 5, 1679, between Spain and France, the Emperor of Germany, and Sweden.

Zutphen, at the siege of which, in 1591, Sir Philip Sidney fell, is a strongly fortified town, on the right bank of the Yssel, and has 11,000 inhabitants. The ramparts are planted with trees, and form a pleasant public walk. The town is well built, and contains several pretty churches, a town-hall, a house of correction, and the S' Gravenhof, or palace of the counts of Gelderland, all of which are stately edifices.

Hardewyk is a fortified port on the Zuider-Zee; the inhabitants, about 4400 in number, carry on the herring-fishery, and have a considerable corn trade.

Thiel, a fortress on the right bank of the Waal, is a place of some manufacturing industry, and has 5000 inhabitants.

GUELPHS and GHIBELINES, the names of

two great political parties which divided Italy and Germany during the middle ages. The words originally were the war-cries of the partisans of Conrad, duke of Franconia, of the Hohenstauffen family, and Henry the Lion, Duke of Saxony, of the house of Welf, rival candidates for the empire; but in course of time the name of Guelphs was given to all who were disaffected to the emperor, and that of Ghibelines to the supporters of the Imperial authority. The names of Guelphs and Ghibelines passed into Italy, and during the reign of Frederick II. it was divided, as it were, into two camps. When the emperors lost their hold upon Italy, the names of Guelph and Ghibeline were used to distinguish the municipal factions, the Ghibelines being for the most part animated by a spirit of aristocracy, the Guelphs professing to be favourers of a popular form of government. In the fifteenth century the names of Guelphs and Ghibelines had become a mere traditional shadow, and were at length extinguished with the independence of the Italian republics. (Sismondi, *History of the Italian Republics;* Raumer, *Geschichte der Hohenstauffen.*)

GUENONS, the French name of a group of monkeys belonging to the ancient continent and its islands, and of which the type may be considered to be the Green Monkey, *Cercocebus Sabæus*, Geoffroy (*Cercopithecus Sabæus*, Exleben).

The apes and monkeys of the old world (family *Simiadæ*) may be resolved into the following groups or subfamilies:—

Subfamily I.

Tail wanting; arms long; general figure anthropoid; stomach simple; cœcum with a vermiform appendix.—Genera, *Troglodytes, Pithecus, Hylobates.*

Subfamily II.

Tail long; no cheek pouches; stomach complex; figure slender; laryngal sacculi; no vermiform appendix. Thumb of forehands short, or rudimentary.—Genera, *Semnopithecus, Colobus.*

Subfamily III.

Tail variable; cheek pouches; stomach simple; laryngal sacculi variable; general figure more robust than in the second subfamily, often massive. Genera, *Cercopithecus, Macacus, Cynocephalus.*

It is to the genus *Cercopithecus*, including its subgenera, that the term Guenon strictly appertains. The leading characters are as follows:—Muzzle moderately prominent; the facial angle 45°-50°; head round; superciliary ridge moderate; molars crowned with acute tubercles; last molar of the lower jaw, except in one subgenus, with only four tubercles; cheek pouches usually ample; laryngal sac variable; ischiatic callosities moderate; general contour light, but vigorous; limbs muscular; tail long; fur moderate; hair in general annulated. Locality, Africa.

The *Cercopitheci*, or *Guenons*, are arboreal in their habits; they inhabit wild forests, and associate in large troops, being, as far as is known, all gregarious in their habits. Their actions are full of energy; restlessness, petulance, and inquisitiveness mark their disposition. During infancy they are gentle, but become irascible and malicious with age. Though their form is light, it is muscular and vigorous, and the limbs are well proportioned; hence the Guenons differ very materially from the *Semnopitheci* [SEMNOPITHECUS], having neither the meagre contour of body, the long slender limbs, nor the depressed face of the latter. The chest is deep; the loins narrow; the tail is long, and acts, though not so decidedly as in the *Semnopitheci*, as a rudder and balancer in their motions, which are characterised by abruptness, energy, and decision. They express their displeasure by grinning and chattering, and though seldom venturing to make a decided attack, yet, congregated in large numbers in their native woods, they harass intruders with missiles, and are not to be repelled without difficulty. Their diet is almost exclusively frugivorous, and they often commit great havoc in fields of grain adjacent to the wooded parts of the country; and that not only by what they devour on the spot, but also by what they carry away in their cheek pouches, which extend beyond the angle of the lower jaw, and which, when opportunity serves, they cram with food to be eaten at leisure.

The *Cercopitheci* are numerous, and resolve themselves into several small groups or sets according to the mutual alliances of the species: these are respectively represented by the Patas, the Green Monkey, the Talapoin, and the Pogonias. The White-Eyelid or Sooty Monkeys form a good subgenus; which Mr. Martin, in his 'Nat. Hist. of Quad.,' 1840, p. 508, has termed *Æthiops.* It is characterised by the presence of a fifth tubercle on the last molar of the lower jaw, by the magnitude of the upper middle incisors; and by the hair being destitute of annulation.

With respect to M. Geoffroy's subgenus *Cercocebus*, of which he makes the Green Monkey the type (*C. sabæus*), we do not see on what grounds it is founded. Few naturalists adopt it. As an example of the genus *Cercopithecus*, we may select the Mona, or Varied Monkey (*C. Mona*) of Western Africa (Guinea).

Guenon (*Cercopithecus Mona*).

The specific characters of this elegant guenon

are as follows:—Head of a yellowish olive colour; a black frontal stripe above the eyebrows is surmounted by another of a whitish tint; back chestnut brown; haunches and limbs externally dusky black; tail black, with a white spot on each side of its origin, on the crupper; under parts and inside of the limbs white; whiskers very full, of a yellowish tint, slightly washed with black.

GUERCI'NO (properly GIOVANNI FRANCESCO BARBIERI) was born in the year 1590, at Cento, a village near Bologna, belonging to the province of Ferrara. He gave very early proof of his talents, by painting the figure of the Virgin on the front of his father's house when he was only ten years of age. He studied under his countrymen Cremonini and Benedetto Gennari. In his first style, he followed the manner of Michael Angelo da Caravaggio. His second style, which is the best and most esteemed, was formed on the results of his observation, the study of the Roman, Venetian, and Bolognese schools, by his connection with the most eminent scholars of the Carracci, and the personal friendship of Caravaggio. He established an academy at Cento in 1616, to which numerous disciples resorted. The general applause which the public lavished on the works of Guido induced him to adopt a third style, in which he endeavoured to attain the suavity of manner of that artist. On the whole, his works are inferior. He died at Bologna in 1666, in the 76th year of his age. His works are at Rome, Parma, Piacenza, Modena, and Reggio, and in most of the museums and cabinets of Europe.

GUERET. [CREUSE.]

GUERIN, PIERRE NARCISSE, BARON, a distinguished French painter, born at Paris in 1774, was the pupil of J. B. Regnault. His works are the perfection of manner in imitation of the antique. The first which attracted general attention was—Marcus Sextus, having escaped the proscriptions of Sulla, returns, and finds his daughter weeping by the side of her dead mother; exhibited in 1798: in 1802 he exhibited an Offering to Æsculapius, and Hippolytus accused by Phædra, brought before Theseus; in 1808, Bonaparte pardoning those who had revolted at Cairo; in 1810, Pyrrhus and Andromache, and Cephalus and Aurora; in 1817, Dido listening to the story of Æneas, Ægisthus urging Clytemnestra to murder Agamemnon, and St. Geneviève.

Guerin was appointed a professor in the Ecole Royale des Beaux-Arts, in 1814; and he was some years director of the French Academy at Rome: he was created Baron after his return from Rome in 1829. He died at Rome, July 16, 1833. He was member of the Institute and of many foreign academies, and chevalier of the Légion d'Honneur and of the order of St. Michael. Many of his works are in the Louvre.

GUERNSEY, one of the islands of the English Channel, belonging to England, is situated between 49° 24′ and 49° 30′ N. lat., and 2° 32′ and 2° 47′ W. long. The form of the island approximates to that of a right-angled triangle: the sides face the south, east, and north-west, and are respectively about 6½, 6, and 9 miles long. The coast is somewhat difficult of approach, from the number of the rocks and the rapidity of the currents around it. The tides rise to the height of 32 feet. The northern part of the island is a level tract, and the coast for the most part lies low: the southern part is more elevated, but the high ground is intersected by narrow valleys and deep glens, and the coast is lofty and abrupt. Springs and rivulets are plentiful. The island is almost entirely of granitic formation: the rocks are chiefly gneiss, granite, and sienite.

The soil is fertile, but the improvement of the land has been checked in parts by the subdivision of property. The country people live upon and cultivate their own estates, the largest of which is said not to exceed 200 Guernsey vergees, or about 74½ English acres, and few of them exceed half that size. A man who farms 20 or 30 acres is accounted a large farmer; the holdings commonly vary from 5 to 12 acres; and the subdivision is progressively going on. Agriculture is carefully attended to; and as much as 54 Winchester bushels of wheat have been raised per acre. The ashes of sea-weed are the manure chiefly used for corn crops. Red-wheat is the chief of these crops. Neither sheep nor horses are carefully reared; but the breeding of cattle, especially of cows, is an object of great attention. The dairy is on all farms of any size the principal object of attention, and the chief source of the farmer's profit. The butter that is made is in high repute.

The island is not so well wooded as Jersey. In some parts however there is tolerable abundance of wood, and gentlemen's seats are generally shaded by trees. English fruits, and fruits of more southern climates, are much cultivated; so likewise are flowers. There is a good deal of waste land on the island. The shores are abundantly supplied with fish.

The only division of Guernsey is into parishes: these are ten in number, and are as follows:—St. Andrew, Câtel, Forest, St. Martin, St. Peter du Bois, St. Sampson, St. Saviour, St. Torteval, the Vale, and St. Peter's Port. The population increased from 24,349 in 1831 to 26,705 in 1841; or, including the small adjacent islands of Alderney, Serk, Herm, and Jethou, to 28,578.

The only town in Guernsey is St. Peter's Port, situated on the slope of a hill about the middle of the eastern coast. What is termed Hauteville (the upper town), on the slope of the hill, to the south-west of the old town, is the most modern and best built quarter. The appearance of St. Peter's Port, on approaching it by sea, is imposing. As the houses rise one above the other, little or nothing is lost to the eye. The streets however are narrow, steep, and crooked; and the houses, though substantial, are dusky-looking and old. The government-house is a substantial building. Near it is Elizabeth College, a handsome and extensive building, of mixed architecture and monastic appearance, surrounded with spacious ornamental grounds. St. Peter's church, a courthouse, a prison, an hospital, three markets, a public library, and assembly-room, a mechanics' institution, a savings' bank, and two joint-stock banks, are among the chief institutions and buildings of the town. St. Peter's church is a fine building of

the 14th century. The harbour, formed by two piers, is small, but sufficient for the trade of the place. The roadstead affords convenient anchorage. Fort George, a regular fortification on the heights, stands about half a mile south of the town: it is considered to be of great strength. In trade and commerce Guernsey is far behind Jersey. In 1844 St. Peter's Port possessed 125 vessels, the largest measuring 288 tons. There is steam communication to Guernsey from Southampton, Plymouth, Torquay, St. Malo, and Granville.

Guernsey has a political constitution of its own. Certain changes were introduced in 1844, which brought the government into the following form. The legislative body is 'the States of Deliberation,' which consists of 37 members; viz. the bailiff of the royal court, who is speaker; the procureur or attorney of the royal court; the rectors of parishes; the constables of the parishes, one from each, who are mere delegates, voting according to the instructions given them by their constituents; and the jurats or judges of the royal court.

The bailiff and procureur are nominated by the crown; the rectors are presented by the governor; the constables and the jurats are elected by the islanders. The 'States of Election' consist of a body of 222 rate-paying electors. There are also local corporations called 'Central Douzaines.' The money required for the public expenses is voted by the States of Deliberation. It is levied in a fixed proportion, according to the ancient mode of assessment practised in the island. But it requires the consent of two-thirds of the members present to give effect to the tax; and the total amount of the tax is limited. The revenue of the island is derived from the general taxes, harbour dues, publicans' and spirit-retailers' licences, and other sources.

The chief court of justice in the island is the royal court, which consists of the bailiff and twelve jurats, the former appointed by the crown, the latter by the islanders. There is an appeal in certain cases to the king in council. Judicial proceedings are conducted in the language of the island. Norman customs and ancient precedents form the basis of the civil jurisprudence, which is a complex mixture of Norman and English law. The power of the royal court is very extensive and undefined. Until 1840 the law of inheritance was very complicated in Guernsey, and led to many family disputes; but an alteration was effected at that time, which has simplified such arrangements. The law of wills has also been changed by the abolition of certain feudal usages.

The island constitutes a deanery in the diocese of Winchester. There are eight livings and one perpetual curacy. There are 11 churches and 3 chapels. The incumbents receive only the small tithes, and the livings are very poor. The great tithes are the property of the crown, and are appropriated to the governor. The glebe-houses are kept in repair at the expense of their respective parishes. The churches are all of great antiquity. Methodists and other dissenters are numerous.

Guernsey contains a considerable number of wealthy inhabitants, and there is a greater degree of refinement than in Jersey; but also a greater spirit of exclusiveness, which has excited the notice, and, in some cases, the ridicule of visitors. The best society is, in dress, manner, and language, on a level with society of the same rank in England. The country people may be divided into three classes: the substantial landowners and farmers, the small proprietors, and the cottagers. The small proprietors and cottagers often combine many industrial pursuits within their daily range. The dialect is the pure Norman of many centuries ago. The knowledge of English is pretty general among the upper classes.

The principal place of education is Elizabeth College at St. Peter's Port. The education given in this institution, originally a grammar-school founded by Queen Elizabeth, includes Hebrew, Greek, Latin, divinity, history, geography, French and English literature, mathematics and arithmetic: instruction in these branches is secured by a college fee of 12*l.* a year. The Spanish, Italian, and German languages, drawing and surveying, music, fencing, and drilling are taught in the college by approved masters.

In each of the parishes there is a school with a small endowment; and there are several other schools and benevolent institutions.

In the sixth century Christianity was introduced into the Norman isles by Sampson, archbishop of St. David's, and by St. Magloire or Maglorius. The religion of the island previous to this period was Druidism, and several cromlechs and other supposed relics of that system remain in the northern part of the island.

The Channel Islands were included in the Duchy of Normandie, and are the only relics of that duchy which remain to the English crown. Guernsey was unsuccessfully attacked by the French in the reigns of Edward I. and Edward VI. In the civil war of Charles I., the island sided with the king's party. Protestantism was introduced into the islands in the reigns of Henry VIII. and Edward VI., and made considerable progress. The islanders have ever since shown a leaning rather to the Presbyterian than to the Episcopal discipline.

Dependencies of Guernsey, viz. Alderney, Serk, Herm, and Jethou.—Of Alderney an account is given elsewhere. [ALDERNEY.] Serk, or Sercq, is about seven miles east of Guernsey. It measures about 3 miles by 1½; but it is so contracted near the centre that it may be regarded as consisting of two parts, one of which is called Little Serk, and they are connected by a high and narrow ridge or isthmus called the Coupée. The coast is indented on every side by small bays; and is so girt with cliffs that there is no way of landing on the island but by scrambling up the cliffs or ascending by a tunnel cut through the solid rock in the little harbour of Croux, on the north-east side of the island. Serk is a table-land, and when approached from the sea presents the appearance of an inaccessible wall of rock, from one to two hundred feet high; but it is broken into romantic valleys, watered by little tumbling brooks, diversified with wood, and, except Little Serk, under cultivation. Near the west side is the islet of Brechou, about 1½ miles in circumference.

The healthiness of Serk is attested by the fact that, on the average of ten years, the yearly mor-

tality is not quite one in a hundred. The population in 1841 was 785. The land is generally under tillage. The produce consists of wheat, barley, oats, beans, potatoes, parsnips, and mangel-wurzel, of which more are grown than requisite for home consumption. From the indivisibility of property the inclosures are larger than in the neighbouring islands.

The island constitutes one manor, comprehending, besides other land, forty original copyhold farms, which cannot be divided either in case of sale or descent. This checks the increase of the population, which has consequently taken place only upon such land as had not been granted in copyhold. These copyhold farms scarcely average more than fifteen acres, and, as this does not afford sufficient occupation for the farmer and his family, all the farmers are fishermen also; they are also their own boat-builders. There are a few shopkeepers and a few artificers. The island, in civil, military, and ecclesiastical affairs, is a dependency of Guernsey, but a power of making local enactments is vested in the lord of the manor and the forty copyholders, who form a little parliament that meets three times in the year. The island forms a curacy, to which the lord of Serk presents: there is a church and a school.

In the sixth century Serk was uninhabited. In the middle ages it was a nest of pirates, but, these having having been destroyed by an expedition fitted out by the men of Rye and Winchelsea, the island was again uninhabited till the time of Edward VI. Then it was occupied by the French, but was retaken by some Flemings in the reign of Mary I., Edward's successor. After this the island was uninhabited till A.D. 1565, when it was settled by a colony sent by Hillary de Carteret, Lord of St. Ouen's in Jersey, under a patent from Queen Elizabeth.

Herm is within two miles and a half of Guernsey; it measures about 1½ miles by half a mile. It is loftiest in its southern part, where the coast is bounded by cliffs; the northern part has a low shore, with sands extending some distance beyond high-water mark. The island is rich in corals, sponges, and corallines. The shores afford abundance of sea-weed for manure. The island is composed of gneiss and granite, which last is quarried. It has one little harbour near the granite quarries.

Some hundreds of acres of land are under indifferent cultivation. The produce of the island is mostly corn, potatoes, and a few sheep; wild rabbits are abundant. The population of the island in 1841 was 38. Herm belongs to one proprietor, who resides on the island; the granite quarries are his, and he is the only cultivator of the soil.

Jethou lies south by west of Herm, distant half a mile from it, and two miles and a half from Guernsey: it is less than half a mile long and about a quarter of a mile broad. It is considerably elevated in proportion to its extent, and the sides are precipitous, except at one spot. It is chiefly composed of gneiss. It belongs to one proprietor, who resides on it. The only land under cultivation is an orchard; the rest of the island is a rabbit warren. The population in 1841 was 6. There is another small island adjacent to Guernsey, called Le Marchant, which was in 1841 inhabited by 5 persons, and a rock called the Caskets, inhabited by 8 persons.

(Inglis's *Channel Islands;* Berry's *History of Guernsey.*)

GUESCLIN, BERTRAND DU, was born in 1314, at the castle of Motte Broon, near Rennes. He received in the house of his father that military education which was usually given to the nobles of his time, but could never learn to read or write. At the age of seventeen he distinguished himself at a tournament, and soon afterwards fought successfully in many battles and sieges against the English. After the capture of King John of France at the battle of Poitiers, he upheld by his efforts the cause of France against the formidable Black Prince, the son of Edward III. of England, and obtained many advantages over the English, but was at length taken prisoner by Sir John Chandos in 1364. Peace being soon afterwards concluded, Du Guesclin was liberated, and he led a large company of the disbanded military, who had become a scourge to the country by their depredations, to the aid of Henry de Transtamare against his brother Pedro the Cruel of Spain, but not till they had plundered Avignon, at that time the residence of the Pope, and forced him to give them absolution. Supported by this force under Du Guesclin, Peter was driven from his throne, and Henry established in his place. Peter however obtained the assistance of the Black Prince, who led a large army to his support, defeated Du Guesclin, took him prisoner, and sent him to Bordeaux. But, it having been hinted to the Black Prince that he kept Du Guesclin prisoner through fear of him, he instantly offered him his liberty on payment of 100 francs, ransom, but Du Guesclin refused this, and valued himself at 70,000 gold florins. Being released, Du Guesclin again joined Henry de Transtamare against Peter the Cruel, who was defeated and put to death, and his rival established on the throne of Castile.

In 1369, when war had begun again between France and England, Du Guesclin was very successful, and took many places from the English; but, having at last met with some reverses, he was calumniated to the king, who loudly manifested his discontent. Du Guesclin felt the injury so deeply that he resigned his command, and resolved to go to Spain; but, staying to assist his friend Sancerre in the capture of the castle of Randam, he died during the siege in 1380.

Du Guesclin is one of the most popular heroes of France, and his life has often been written.

GUIANA. [GUYANA.]

GUICCIARDINI, FRANCESCO, born at Florence, in 1482, of a noble family, distinguished himself early in the study of the law, of which science he was made professor in his native city. In 1512 he was sent by his countrymen as ambassador to Ferdinand of Aragon, and in the following year on a mission to Leo X., who took him into his service, and appointed him governor of Modena, and afterwards of Parma.

After the death of Leo, and the short pontificate of Adrian VI., Clement VII. retained Guicciardini in his service, and trusted implicitly to him as his chief adviser, especially on the affairs of Florence. After the surrender of that city to the imperial and papal arms, in 1530, Guicciardini, as the agent of the Pope and the Medici, had a considerable share in the changes that took place in the government of the republic, in which a commission of twelve was appointed, called 'the reformers of the state,' of which Guicciardini was by far the most influential. Afterwards, he and the other adherents of the Medici resorted to the old expedient of calling together a parliament.

On the appeal being made to the Emperor Charles V. against the cruelty and licentiousness of the new duke, Alessandro de' Medici, Guicciardini defended his master in an able though sophistical manner, and succeeded in getting the complaint dismissed; he at the same time prevented the duke from yielding to the request of the Emperor that he should acknowledge himself his feudatory. When the Duke Alessandro was murdered in January 1537, Guicciardini by his timely measures prevented a popular explosion, and obtained the appointment of Cosmo de' Medici as governor of the Florentine republic. Here however Guicciardini miscalculated. Cosmo soon exchanged his title of governor for that of duke. Guicciardini resigned his office, and withdrew to Arcetri, where he employed himself in writing the contemporary history of Italy. He died in May 1540, at the age of 58.

Of Guicciardini's history the first sixteen books were published in 1561; the other four appeared afterwards; and the whole twenty together were published for the first time at Venice in 1569, 'Istoria d' Italia di Francesco Guicciardini, Gentiluomo Fiorentino, libri xx.' The most complete and correct edition is that by Professor Rosini, of Pisa, 10 vols. 8vo., 1819-20. Guicciardini stands by common consent at the head of the general historians of Italy. In his tone however he cannot be called either moral or patriotic.

GUICOWAR. [Baroda.]

GUIDO D'AREZZO was born at Arezzo, in Tuscany, towards the end of the tenth century. When young, he entered a Benedictine monastery, and afterwards became a monk of the order. There he first conceived a new method of writing music, and of instructing in the art; and, having well digested his plan, he there also carried it into effect, at a school opened by him for the purpose. He went to Rome on the invitation of Pope John XIX., and then visited the abbot of Pomposa, in the duchy of Ferrara, where he wrote his 'Micrologus,' or brief discourse on music, in which most of his inventions are described, as well as his method of instruction. But his doctrine of solmisation, or the use of the syllables *ut, re, mi,* &c., is explained in a small tract under the title of 'Argumentum novi Cantus inveniendi.' To Guido we are indebted for the invention of the Staff, *i. e.* the lines and spaces in music, for the reformation of the Scale, as also of the mode of notation, and for the art of Solmisation.

GUIDO RENI (whom we place here as being, like Raphael, more generally known by his Christian name) was born at Bologna in 1574, where he studied painting, first under Denis Calvart, a Flemish artist, and afterwards visited the school of the Carracci. His genius was not equally adapted to all subjects. He preferred and excelled in those in which tenderness, pathos, or devotion predominate; and in these he is distinguished from all other painters. His standard of female beauty was founded on the antique, the Venus de' Medici, and the Daughters of Niobe. Among his most celebrated works were, an altarpiece in the church of St. Philip Neri at Fano, representing Christ delivering the keys to St. Peter; a St. John in the Archiepiscopal Gallery at Milan; the Virgin and Child and St. John, in the Tanaro Palace at Bologna; and the Penitence of St. Peter after denying Christ, with one of the Apostles comforting him, in the Zampieri Palace, one of his most excellent works. He died in 1642, aged 68.

GUIGNES, JOSEPH DE, born in 1721, at Pontoise, studied the Oriental languages under Etienne Fourmont. In 1745 he was nominated Oriental interpreter to the royal library in the place of Fourmont, and in 1752 was chosen a member of the Académie des Belles Lettres. The French Revolution reduced him to great destitution, but he supported his misfortune with perfect equanimity. He died at Paris in 1800.

His 'Histoire Générale des Huns, des Turcs, des Mogols, et des autres Tartares Occidentaux,' Paris, 1756-58, 5 vols. in 4to., is written with great industry, and founded upon Oriental authorities; but the work is considered defective in criticism and style. He was also the author of 28 memoirs, inserted in the collection of the 'Mémoires' of the Académie des Inscriptions, and of some other learned works.

GUILDFORD. [Surrey.]

GUILDS. [Municipal Corporations.]

GUILLEMOTS (*Uria* of Brisson, Temminck, and others), a genus of sea-birds, which Linnæus regarded as a section of his genus *Colymbus,* and which Cuvier places in his family of the *Plongeurs* or *Brachyptères,* a family which includes the Grebes (*Colymbus*), the Guillemots (*Uria*), the Auks (*Fratercula, Alca,* &c.), and the Penguins (*Aptenodytes, Spheniscus,* &c.).

By most modern ornithologists the Guillemots are placed in the family *Alcadæ* [Alca; Auk], as a transition link between the Divers (*Colymbus*), and the more typical Auks, and other genera. [Penguin.] In this point of view Mr. Vigors regarded the genus *Uria,* and Mr. Selby, in his 'Illustrations of British Ornithology,' follows out the same theory, placing the Guillemots as the first order of *Alcadæ,* and the Divers as the last of the preceding family *Colymbidæ.*

The generic characters are as follows:—Bill of moderate length, straight, strong, compressed, and cultrated; upper mandible slightly arched towards the tip; angle of the lower mandible gently ascending; commissure nearly straight; nostrils basal, lateral, concave, longitudinally cleft, and half covered by a feathered membrane advancing from

the forehead and sides of the face; wings short, narrow, and acute; tail of 12 or 14 feathers, very short; legs situated at the back part of the abdomen; the tibiæ concealed within the integuments; tarsi short and compressed; feet of three toes, all directed forwards, and palmated; outer and middle toes of equal length; the inner one much shorter; claws falcate and sharp-pointed.

Geographical Distribution and General Habits.—The Guillemots seem especially framed for existence in the Arctic and even Polar regions, and are seldom comparatively found in the warmer latitudes. In the north they swarm on all the rocks and islets of the chilling seas. In the short but bright summer that gilds some of their northern haunts they make haste to deposit their eggs, sometimes only one, on the bare rock, without wasting the precious days in making a nest. On the naked ledge that overhangs the sea the young Guillemot is hatched, and, as soon as it is able to bear the shock, is conducted or rather tumbles from its hard nursery into the bosom of the ocean, where a plentiful harvest is spread for it. Here the Guillemots are indeed in their element. Plying their way with wings and feet beneath the waves, and even beneath the ice, they make prey of the small fish and crustaceans which form their principal food. Their native rocks or the ice-caverns shelter them from the storm, and it is only when the winter is more than hyperboreally severe that some of these species are driven to a temporary resort to more temperate climates. Their flight is sharp and rapid, though of no long duration, and generally directed just above the surface of the sea. Their eggs, which are reckoned palatable, notwithstanding their fishy diet, have a thick shell, which has a dull appearance.

The species of the restricted genus *Uria*, as given by Prince L. Bonaparte, are — 1. *Uria Troile*. Locality, Northern Europe and America. 2. *Uria Brunnichii*. Locality, north of Europe, and north western parts of North America. 3. *Uria Grylle*. Locality, north and central parts of Europe, and North America generally. 4. *Uria Maudtii*, Licht. Locality, north-east of Europe.

All are subject to a double moult, and the summer dress differs in many respects from that of the winter.

Two species only are truly British: the Foolish Guillemot (*Uria Troile*), and the Black Guillemot (*Uria Grylle*). By way of example, we may describe the Foolish Guillemot as a type of the genus.

Description of both sexes (adult) in their Winter Dress.—Summit of the head, space between the eye and the bill, longitudinal band behind the eyes, and all the upper parts, of a velvety black, slightly inclining to ash; all the lower parts and the extremity of the secondaries pure white: white is also found between the band behind the eyes and the back of the nape, and advances towards the occiput, where it forms on each side an open angle. The ashy blackish colour of the lateral part of the neck seems to form towards the breast a kind of collar, feebly indicated by bright ash. Bill ashy black; inside of the mouth livid yellow; iris brown; feet and toes yellowish brown; posterior part of the tarsus and membranes black. Length from the bill to the claws rather more than 15 or 16 inches. N.B.—The female is rather less than the male. In this state Temminck, whose description we have given, considers the bird to be the *Colymbus minor* of Gmelin; Lesser Guillemot of Pennant; *Der Dumme Lumme* of Bechstein; and *Troillumme* of Meyer.

Summer or Nuptial Plumage. — Head, region of the eyes, throat, and all the upper part of the neck, of a velvety brown; inside of the mouth bright yellow: the rest of the plumage as in winter. Thus clad, it is the *Colymbus Troile* of Linnæus and Gmelin; *Le Guillemot* of Buffon; *Foolish Guillemot* of Latham.

Foolish Guillemot (*Uria Troile*).

Young of the Year.—Principally distinguished from the old birds in their winter plumage by the comparative shortness of the bill, which is ashy and yellowish at the base; the black of the upper parts is clouded with ash-colour; the stripe or longitudinal band is not distinct, and mingles by means of ashy spots with the white of the sides of the occiput. Ashy brown predominates on the lower parts of the neck, and the white of the lower parts is not so pure; the tarsi and toes are of a livid yellowish hue.

Geographical Distribution. — The Arctic Seas of the Old and the New Worlds; migratory in winter in large companies along the coasts of Norway and Holland; very common at that time along the shores of the Baltic and the maritime coasts of Holland and France; more rarely found 'upon our seas and great lakes of the interior.' (Temminck.) Spitzbergen, Lapmark, and the White and Icy Seas as far as Kamtchatka. Along the whole coast of Hudson's Bay, Labrador, and Newfoundland. (Nuttall.) The great body of the American birds of this species winter in the Bay of Fundy. (Audubon.)

In the British Islands they are numerous (among other localities) in the Orkneys, on the Bass Rock, the Farn or Fern Isles, the cliffs of Scarborough, the Needles and the cliffs of the Isle of Wight, the Goodeve Rocks not far from St. Ives in Cornwall, and the Isle of Priestholm, contiguous to the Island of Anglesey, &c.

Habits, Propagation, Food, &c.—The appellation of Foolish Guillemot has been given to this species from its often suffering itself to be taken by the hand or killed on the spot, especially in the breeding season, rather than quit the cliff it has chosen for its abode. The sea is the favourite resort of these birds when they leave their cliffs, and there they seek their food, consisting principally of small fish, small marine crustaceans, and small bivalves; they dive with the greatest facility. They are with difficulty roused to flight. Early in April and May, or at the end of March, they begin to assemble on their favourite cliffs in Britain, and lay their single unprotected egg on the flat bare ledge of rock. This egg is generally of a pale green, blotched and stained with black and dark brown (umber). Sometimes the egg is white, with or without a few spots. It is a remarkable sight to see these birds, where they abound, sitting upon their eggs on their rocky shelves, often in line, and so close that they nearly touch each other. As soon as the young are capable of migrating, which is in August, or by the end of that month, they are said to disappear from our shores. Mr. Selby, whose observations are always valuable, gives the following interesting account of these birds: 'Incubation lasts for a month, and when the young are first excluded they are covered with a thick down, of a blackish gray colour above, and white beneath. This gradually gives place to the regular plumage, and in the course of five or six weeks from the time of hatching they are capable of taking to the water. During the time they remain upon the rock the parents supply them plentifully with the young of the herring and herring-sprats, which form the principal food of this and other species belonging to the *Alcadæ*. Upon the Northumbrian coast these Guillemots breed in great numbers on the Fern Islands, a locality that has afforded me ample opportunities of attending to their economy and watching the changes they undergo. They have selected the summits of three fine isolated pillars, or masses of whinstone (trap-rock), that rise upwards of thirty feet above the level of the sea. Upon these the eggs are laid as close as possible, merely allowing room for the birds to sit upon them, which they do in an upright position. The appearance they make in a dense mass is curious, and the interest is increased by the number of Kittiwakes (*Larus tridactylus*) which hover around, and which breed in the small side clefts, or on the projecting angles of the rock; and by the nests of two or three Crested, or Green, Cormorants, which, from the unusual confidence they display in continuing to sit upon their eggs, even when overlooked from the opposite precipice at only a few yards' distance, seem to be well aware of the security of the station they have chosen. The great body of the breeding birds arrive towards the end of March or the beginning of April, at which time most of them have acquired the perfect nuptial plumage. I have however obtained them much earlier, and when the white upon the throat was only giving place to the pitch-coloured black that distinguishes them till after the sexual intercourse. At this time they often lose so many of their quill-feathers as to be totally incapable of flight; but these are soon reproduced, and the colonies which had made the English coasts their summer quarters retire to more southern latitudes to pass the winter months. Their place in this country is but sparingly supplied by a few stragglers from the great bodies that, being bred in still higher latitudes, make the friths of Scotland and its isles the limit of their equatorial migration.' 'Illustrations of British Ornithology,' vol. ii.

(Pennant, Selby, Gould, Yarrell, Audubon, Richardson, &c.)

GUILLOTINE, an instrument for the infliction of capital punishment, proposed to the National Assembly of France by Joseph Ignace Guillotin, a physician, a native of Saintes, and a member of the Assembly. It was adopted by a decree of the 20th of March, 1792.

This instrument, under other names, had existed as a means of public execution long before, in Germany, Bohemia, Italy, Scotland, and England. In German this instrument was called *der Planke der Diele* (the plank of wood), and in older language *Falbeil* (the falling hatchet). In Italy it was known by the name of *Mannaia*. Evelyn, in his Memoirs, vol. i. p. 170, states that he saw a similar instrument at Naples. Pennecuik, in his 'Description of Tweeddale,' pp. 16, 17, speaks of the Regent Morton of Scotland being executed by the *Maiden* at the cross of Edinburgh, as 'art and part' of the murder of Darnley, 'which fatal instrument, at least the pattern thereof, the cruel Regent had brought from abroad to behead the Laird of Pennecuik of that ilk. In England, what has been since called the Guillotine was used only at Halifax in Yorkshire, as far back as the time of Edward III. It was in 1650 that the last malefactors there suffered by it. Joseph Ignace Guillotin, who revived the use of this instrument in France, is supposed by many to have perished by his own invention. But this is not correct. He died a natural death, May 26, 1814, at the age of 76.

GUIMARAES. [Entre-Douro-e-Minho.]

GUINEA, an extensive country on the west coast of Africa, between 4° and 10° N. lat., and 5° E. and 13° W. long., has a coast-line of more than 1800 miles. The inland part is mostly unknown; but the coasts have been visited by European vessels for four centuries. The countries along the sea-coast are known to European sailors under six names—Sierra Leone, Grain Coast, Ivory Coast, Gold Coast, Slave Coast, and Benin. Referring for other details to Ashantees; Coast, Gold; and Sierra Leone; we here treat of Grain Coast, Ivory Coast, Slave Coast, and Benin.

The *Grain Coast* extends from Cape Mesurado (7° N. lat.) to Cape Palmas (4° 30′ N. lat.), a distance of somewhat less than 300 miles. The coast is rocky; the interior is a succession of mountain-ridges and of valleys; the mountains are mostly wooded, and the valleys wide and fertile, producing rich crops of rice, which is exported to a large amount. Cattle, sheep, pigs, goats, poultry, rice, pepper, camwood, and ivory are abundant. The whole country is divided into three kingdoms, namely Cape Mount, with the

towns of Couseea and Kingston; Sanguin, with its port Bassa [BASSA]; and a negro kingdom near Cape Palma, inhabited by the Settra Croo tribe. Within the boundary of Sanguin is the American settlement of Liberia, established in 1821. The capital, Monrovia, had some years ago 700 inhabitants, and the whole population exceeded 20,000. The English government has recently entered into commercial relations with this colony.

The *Ivory Coast* occupies the countries between Cape Palmas and Cape Three Points, a distance of nearly 400 miles. In this part the high land of the interior does not come close to the beach, but is divided from it by a low tract, about ten or twelve miles wide on an average. This part of Guinea is inhabited by a number of small negro tribes. The English and Dutch had some establishments west of Cape Three Points, but they have been abandoned, with the exception of the Dutch fortress of Axim. Near Cape Palmas is a spacious and secure harbour formed by a reef.

The *Slave Coast* begins on the west at the Rio Volta, which empties itself into the Gulf of Guinea, near the meridian of Greenwich: it extends eastward to the neighbourhood of the river Formosa, or Benin, a distance of more than 400 miles along the sea-shore. The Rio Volta, which comes down from a great distance (some say 400 miles), is a broad river in the interior, but towards its mouth it divides into several branches, and forms a kind of delta. The shores of this coast are flat and low, and partly rendered inaccessible by sand-banks. They are covered by extensive salt-marshes and numerous lagoons, traversed by several rivers, among which the Lagos is the most considerable. The interior is partly fertile savannahs, and partly forest. It is divided between the kingdoms of Dahomy, Ardrah, and Lagos. Dahomy occupies the western portion, lying contiguous to the country of the Ashantees. Its capital, Abomy (7° 12′ N. lat.), lies in the mountain-region, and is stated to contain 24,000 inhabitants. Calmina, farther south, has 15,000 inhabitants; and Whydda is also considerable. The principal harbour of Dahomy is Grewhe, with 6000 or 7000 inhabitants. The kingdom of Ardrah extends east of Dahomy, and is less extensive, comprehending only a considerable portion of the plain. Its capital, Ardrah (6° 26′ N. lat.), is built on the banks of a lake, and contains 20,000 inhabitants. Its port is Porto Novo. The kingdom of Lagos occupies the countries extending on both sides of the lower course of the river Lagos. In its territory are the towns of Lagos, with about 5000 inhabitants; and Badagry, with a population of 10,000. The king of Lagos is dependent on the king of Yarriba, whose dominion extends over the whole breadth of the Kong Mountains to the banks of the river Quorra, and along that river to 10° N. lat. In Yarriba, Clapperton and the Landers met with the towns of Katunga, the capital; Dufo, with 15,000 inhabitants; Choodoo, with 7000 inhabitants; Koosoo, with 20,000 inhabitants; and Artoopa, with 6000 inhabitants.

The kingdom of *Benin* is said to extend along the coast from the river Benin to Formosa, and twenty days' journey into the interior, and thus comprehends a large portion of the great delta of the Niger. In this however is included the kingdom of *Waree*, tributary to Benin, which extends southwards from the left bank of the river Benin to Formosa. The town of Benin, capital of the kingdom, is in 6° 20′ N. lat., 5° 50′ E. long., at some distance from the right bank of the river Benin. It occupies a large area, but the population is probably not more than from 15,000 to 20,000. The king's palace is of great extent, including several squares, with ranges of apartments for officers of state, servants, and others, and with long galleries supported by wooden pillars. The town of Waree, on the north bank of the river Waree, is the capital of the kingdom of Waree, and contains a population of about 5000.

(Dalzel; Robertson; Hutton; Adams; Monrad; Lamarthe; Bowdich; Clapperton; Lander.)

GUINEA, NEW. [PAPUA.]

GUINEA. [MONEY.]

GUINEA-FOWL. [POULTRY.]

GUINEA PEPPER, the seeds of two species of *Amomum*, found on the west coast of Africa, within the tropics; the one, *A. Grana-Paradisi*, the other, *A. grandiflorum*. They are powerfully aromatic, stimulant, and cordial, and are used for the same purposes as Cardamoms.

GUINEA-PIG (*Cavia Cobaya, Restless Cavy*), the well-known Brasilian rodent now domesticated in Europe.

GUINES. [PAS-DE-CALAIS.]

GUINGAMP. [CÔTES-DU-NORD.]

GUIPUZCOA. [BASQUE PROVINCES.]

GUISCARD, or WISCARD, R. [SICILIES, TWO.]

GUISCHARD, CARL GOTTLIEB, was born at Magdeburg in 1724, and died in Berlin, May 15, 1775. He became a colonel in the service of Frederic the Great, and distinguished himself in the Seven Years' War, after the end of which he wrote several works on the military art of the ancients, among which are, 'Mémoires Militaires sur les Grecs et les Romains,' and 'Mémoires Historiques et Critiques sur plusieurs Points d'Antiquités Militaires.'

GUISE, or GUYSE, DUKES OF, the title of a branch of the sovereign house of Lorraine, which settled in France at the beginning of the sixteenth century. Claude of Lorraine, fifth son of René II., duke of Lorraine, and of Philippa of Guelderland, after contesting his father's succession with his elder brother, went to France, where he married Antoinette de Bourbon in 1513. In 1527 Francis I. made him duke of Guise in Picardy, and peer of France. He died in 1550, leaving a numerous family. One of his daughters married James V., king of Scotland, by whom she had Mary Stuart. Claude's eldest son, Francis, born in 1519, succeeded to the title of Duke of Guise. He had been previously made by Henry II., duke of Aumale, in 1547, and he married Anna of Este, daughter of the Duke of Ferrara, and granddaughter, by her mother Renée, of Louis XII. Francis of Guise was the most illustrious of his

family, both for his military talents and for his humanity and generosity. He fought in the wars against Charles V., and afterwards against Philip II., and took Calais from the English, who had possessed it for more than two centuries. He and his brother Charles, cardinal of Lorraine, had the principal share in the government of France under the reigns of Henry II. and Francis II. The conspiracy of Amboise (as it was called) by the Calvinists and the Prince of Condé, was intended to overthrow the power of the Guises; but the duke, having had timely information of it, removed King Francis II. to Amboise, and had himself appointed lieutenant-general of the kingdom, upon which most of the conspirators were arrested and executed. Under Charles IX. the influence of the Guises somewhat declined. The war of religion having broken out in 1562 by the affray at Vassy, where the Duke of Guise's servants and attendants killed a number of Calvinists, the duke fought under the Constable of Montmorency at the battle of Dreux. Shortly after he was murdered in his camp before Orleans by Poltrot de Méré, a Calvinist. Francis's eldest son, Henry, succeeded to his father's titles, and became the leader of his party. Less magnanimous and more factious than his father, he mixed deeply in all the intrigues and plots of the League. Henry of Guise was one of the advisers of the St. Barthélémy massacre, and he ordered the murder of Coligny. He excited the fury of the populace against the Calvinists, whom he not only defeated in battle, but hunted down in every part of the kingdom. After the death of Charles IX., he ruled at will over Henry III., and obliged him to break the promises of peace and toleration which he had made to the Calvinists. Henry III. however, and even his mother Catherine de' Medici, became jealous of the ambition and weary of the insolence of the Guises, and the duke was forbidden to appear at the court and at Paris. Upon this he raised the standard of revolt against his sovereign, and defeated him in his own capital on the 12th May, 1588. The king withdrew to Chartres. The states were assembled at Blois on the 16th October, 1588, and the deputies were found to be almost wholly in the interest of the Duke of Guise and his brother the cardinal, who were present. The duke demanded to be appointed high-constable and general-in-chief of the kingdom. Henry then resorted to assassination in order to get rid of the Guises. As the duke was entering the royal apartment on Dec. 23, 1588, he was pierced with daggers, and died at 38 years of age. The cardinal his brother was arrested and killed in prison the next day. Their brother, the Duke of Mayenne, escaped. Charles, eldest son of Henry of Guise, was arrested at Blois, and confined in the castle of Tours, from which he escaped in 1591. He and his uncle of Mayenne, and his cousin Charles, duke of Aumale, became the leaders of the League against Henry IV. After that king's abjuration, Charles, Duke of Guise, submitted to him in 1594, and the Duke of Mayenne followed his example next year. Charles was made governor of Provence, but, under the following reign of Louis XIII., Cardinal Richelieu, jealous of his name and influence, obliged him to leave France. He retired to Tuscany, where he died in 1640. His son Henry II., born in 1614, was at first brought up for the Church; but after the death of his elder brother he quitted the clerical state, and assumed the title of Duke of Guise. Having conspired against Cardinal Richelieu, he was tried by the parliament, and condemned, *per contumace*, in 1641. In 1647 he placed himself at the head of the revolted Neapolitans, but was taken prisoner by the Spaniards; and, being released in 1652, he returned to Paris, where he died in 1664, leaving no issue. His 'Mémoires' were published after his death. His younger brother, Louis, duke of Joyeuse, left a son, Louis Joseph of Lorraine, duke of Guise, who died in 1671, leaving an infant son, who died in 1675, five years of age. The line of the Guises thus became extinct.

GUITAR, a musical instrument which, in various shapes, may be traced to the remotest periods of antiquity. The word is derived from the Greek κιθάρα; and the terms *Cittern* and *Gittern*, used by the old English poets, are but corruptions of the primitive word.

The English and French guitar of the last century was wide and thin in body, short in the neck, and strung with wire. The modern guitar, which is of the Spanish kind, and differing little from the lute, consists of a body from seventeen to eighteen inches in length, four in depth, and of a neck of about sixteen inches, the latter carrying a finger-board divided by seventeen frets. It has six strings, three being of silk covered with silvered wire, and three of catgut.

The compass of this elegant instrument is from E below the base staff to A above the treble staff, including all the intermediate tones and semitones. The best and cheapest guitars are made in Germany.

GUJERAT, or GUZERAT. [HINDUSTAN.]

GULF. [BAY.]

GULF-STREAM. [ATLANTIC OCEAN.]

GULL. [LARIDÆ.]

GULO, the name of a genus belonging to the family *Mustelidæ*, but which Cuvier places within the pale of his *Plantigrade Carnassiers*, though he acknowledges that the species approach the *Mustelidæ* in dentition and habits.

M. F. Cuvier, in the 32nd number of his 'Dents des Mammiferes,' says that he might have treated of the *Grison*, the *Tayra* (*Gulo barbatus* of Desmarest), and the *Glutton*, in his preceding article, where he treats of the dentition of the *Putois* (*Putorius* of G. Cuvier), *Zorille* (Zorilla), and *Martes* (Martens); for, he remarks, the dental arrangement of the Grison and Tayra resemble that of Putorius, and that of the Grison is similar to the formula observed in Martes. The first two, he states, have two false molars above and three below, and the last has an additional one in each jaw. For the rest, these animals have nothing in their teeth to distinguish them; that is to say, he continues, they have the same incisives, the same canines, and the same tubercular teeth. They have consequently all a relish for blood, and could not be separated from each other, were it not for the

plantigrade feet of the Grison, the Tayra, and the Glutton, an organisation which does not however change their propensities, and only leads to the modification of the means by which they satisfy their appetites.

Under the genus *Gulo* Desmarest and Cuvier include the Glutton of Northern Europe (*Mustela Gulo* of Linnæus), the Glutton of America (*Ursus luscus*, Linn.), the Grison (*Viverra vittata*, Linn.), the Taïra or Galera (*Mustela barbata*, Linn.), and the Ratels. By modern zoologists the genus *Gulo* is restricted, and contains only two known species, if species they be, namely, the Glutton of Northern Europe, or *Rossomak* of the Russians, and the Glutton of North America, the Wolverene or Quickhatch of the English residents at Hudson's Bay. It is remarkable that, while Linnæus placed the latter among the bears, he regarded the former as a different form, and termed it *Mustela Gulo*. Pallas and Gmelin conferred upon it the title of *Ursus Gulo*.

The characters of the genus *Gulo*, as at present restricted, are as follows:—

Incisors, $\frac{6}{6}$; Canines, $\frac{1—1}{1—1}$; Molars, $\frac{5—5}{6—6}$=38.

There are three false molars above, four below; the carnassière is well developed, and behind it there is a little tuberculous tooth.

The body is rather low on the limbs; the ears are short and rounded; the feet five-toed, with hooked nails; the sole of the hinder feet rests almost completely on the ground; tail moderate, with a fold underneath at its base in lieu of a pouch. Habits nocturnal. It is not clearly ascertained that the Old World Glutton (*Gulo arcticus*, Desm.) and the American Glutton (*Gulo luscus*) are specifically distinct; indeed, most naturalists regard them as mere varieties; the former however is darker in colour than the latter, being of a deep chestnut passing into black on the limbs with a brown disc on the back.

The American variety is the *Quickhatch* of Catesby and of the English residents at Hudson's Bay, *Wolverene* of Ellis, and *Wolverene* of Pennant.

Wolverene (*Gulo luscus*).

The Glutton inhabits all the countries bordering on the northern ocean, both in Europe and Asia. In Norway it is very common in Drontheim. In America it inhabits Canada, the Fur Countries, and the uncultivated portions of the north of the United States, where it is well known in consequence of the depredations it commits. It is a fierce and voracious animal, but by no means formidable to man or the larger beasts, though its strength is very great in proportion to its size. Slow in its movements, it makes up by perseverance and industry for this defect, and at a steady pace pursues its prey for miles, hunts out weak or dying animals, robs the hunter's traps of their booty, and destroys hares, marmots, and birds, which it seizes unawares.

Buffon, relying on the authority of Olaus Magnus and other old writers, has dressed up his narrative of the habits of this animal with much of the marvellous, which has been again retailed by succeeding naturalists, who have evidently placed confidence in the statements. According to these writers, the Glutton employs the most subtle artifices in order to surprise its larger victims, among which are the reindeer and the elk. Thus Demarest says, 'It overcomes the larger animals, as elks and reindeer, darting upon them from the branch of a tree (as they browze unsuspectingly below), clinging forcibly to the back and tearing the neck with its nails and its teeth until they fall exhausted.' The victor then feasts upon his prey. This statement and several others similar to it are, according to Dr. Richardson, entirely fictitious. No doubt it fastens upon animals which it is capable of overcoming, as a stoat does upon a leveret; but the rest is exaggeration.

Gmelin, Dr. Richardson, and Mr. Graham, in his MSS., agree in the fact that the Glutton is extremely annoying to the fur hunters, visiting the traps and devouring the animals taken in them: in Siberia it rifles the traps of the sable and the corsac fox; and in North America, as Mr. Graham informs us, the wolverenes do more damage to the small-fur trade than all the other animals conjointly. They will, he states, follow the marten-hunter's path round a line of traps extending forty, fifty, or sixty miles, and render the whole unserviceable, merely to come at the baits, which are generally the head of a partridge or a bit of dried venison. They are not fond of the martens themselves, but never fail of tearing them in pieces or of burying them in the snow by the side of the path, at a considerable distance from the trap. Drifts of snow often conceal the repositories thus made of the martens at the expense of the hunter, in which case they furnish a regale for the hungry fox, whose sagacious nostril guides him unerringly to the spot; and two or three foxes are often seen following the wolverene for this purpose.

According to Dr. Richardson, the Glutton preys much upon the beaver during summer; it feeds also upon mice, marmots, &c., as well as upon the carcases of beasts which have been killed by accident; it also destroys the hoards of provision laid up by the hunters for their own use. It is so suspicious that it will rarely enter a trap itself; but beginning behind pulls it to pieces, scatters the logs of which it is built, and carries off the bait. Though fierce and resolute in defending itself against the attacks of other quadrupeds, it

flies from the face of man, except when urged by extreme hunger. The fur of the Glutton is much in request, especially that of the Siberian animal, which is dark and beautifully glossy. The length of the Glutton, exclusive of the tail, is about two feet six inches, that of the tail with the fur being ten inches. The female breeds once a year, the cubs being from two to four in number. Their fur is soft, downy, and of a pale yellowish white. (Richardson, 'Fauna Boreali-Americana;' Captain James Ross, 'Appendix to Sir John Ross's Last Voyage.')

With regard to the Grison (*Gulo vittatus*, Desmarest), it forms the type of the genus *Galictis* of Bell. It is a sanguinary animal, inhabiting Guyana and Paraguay; it measures about two feet in length. Its fur above is deep brown, each hair being tipped with white; a broad white line passes from the forehead on each side to the shoulders. Muzzle, throat, under parts, and limbs black. For an account of the anatomy of the Grison see 'Proceeds. Zool. Soc.,' 1833. Mr. Gray distinguishes the Tayra or Taïra generically under the name of *Galera*, Brown; and observes, on the occasion of defining his genus *Helictis* ('Zool. Proc.,' 1831), that the *Gulo orientalis* of Dr. Horsfield's 'Zoological Researches in Java' appears to him to form a second species of the genus.

The Taïra is a native of Guyana, Brazil, and other portions of South America. ('Proceeds. Zool. Soc.,' 1831, pp. 74, 94.)

Mr. Gray, in the 'Zoological Proceedings' for 1830-31, p. 95, founds a new genus, *Paguma*, on the *Gulo larvatus* of Hamilton Smith, *Viverra larvata* of Gray, in the 'Spicilegia Zoologica.' (Locality, China.)

Fossil Gulones.—Fossil Gluttons have been detected in the ossiferous caverns: *Gulo spelæus* (Goldfuss), for instance, has been found in those of Gailenreuth, and Sundwick, in Westphalia. Professor Kaup also records another extinct species, *Gulo antediluvianus* (Kaup), from the Epplesheim sand.

GUM is a proximate principle of vegetables, of more universal occurrence than any other secretion by plants. It is the material generally prepared by them for their own nourishment, and is at first in a state of solution; but when it escapes to the exterior of the bark it frequently becomes thickened, and even solid and pulverisable.

The purest gum (arabic) consists of a principle termed *arabin*, and is soluble in water, forming with it a mucilage. Other gums contain *bassorine*, either alone, or with arabin and other matters. Gum-arabic, according to Gay-Lussac and Thénard, consists, in 100 parts, of C 42.23, H 6.93, O 50.84. The term gum is sometimes erroneously applied to gum-resins, such as assafœtida, &c.

Most of the commercial gums are obtained by incisions made in the bark of several species of acacia growing in Arabia, India, Upper Egypt, Senegal, &c. The specimens differ considerably in colour, even when obtained from the same species. Genuine gum-arabic occurs in pieces from the size of a pea to that of a walnut, or larger, which are irregular in shape, or roundish or angular; either white, yellowish, or dark wine-yellow; scarcely any odour; taste mawkish, glutinous. Gum, when in powder, is often adulterated with starch, the presence of which is detected by tincture of iodine; or, when cold water is used for the solution of the gum, the starch will remain undissolved. The mucilage made with cold water is not only purer, but keeps better, and for all purposes for which it can be used is preferable to that made with warm water, which is the common method.

Gum is highly nutritive, six ounces in twenty-four hours being deemed sufficient to sustain the life of an adult; yet it is not very easily digested when taken alone, and will often pass through the stomach nearly unchanged, if not associated with some bitter or astringent principle. This property however renders it demulcent in affections both of the throat and also of the intestines, by sheathing the membrane from air or the irritation of acrid secretions. Hence allowing a portion to dissolve slowly is often useful in common colds. Mucilage is also used to suspend many insoluble matters in water. Its agglutinating properties render it valuable in many of the arts.

GUM-RESINS are secretions of plants, which are produced in the greatest quantity, and most perfectly elaborated, in warm countries. They are obtained chiefly from trees and shrubs of particular tribes of plants, rarely from herbaceous plants, except the large herbaceous umbelliferæ, which yield the fœtid gum-resins. They either exude spontaneously, or are procured by incisions of the stem and branches. When they first escape to the surface they are fluid, and of a light colour, but gradually harden, and become of a deeper hue, either by the evaporation of some of their volatile oil, or by the absorption of oxygen from the air, and the conversion of the oil into a resin. Some remain in a semi-liquid viscid state, such as sagapenum and galbanum, which are only pulverisable in winter. Most gum-resins possess a strong odour, which in many instances is disagreeable, such as that of assafœtida, with a warm acrid taste, and by application to the skin for any considerable time they cause redness and inflammation.

Gum-resins are with difficulty soluble in the animal juices, yet, as they must be assimilated before they produce their characteristic effects, they require to be used for some time before the secretions of the body acquire their peculiar odour. They influence the secretory and excretory processes, which they rouse to continued action. They also act upon the skin as sudorifics, and more permanently than the volatile oils. They possess considerable antispasmodic powers, and hence are much used in nervous complaints. They greatly promote digestion when the stomach is feeble owing to a defective supply of nervous energy. Their utility in the treatment of hysterical and other paroxysms is very much increased by administering them in a state which admits of ready solution in the gastric fluids; hence the acetous preparations of them are much more potent than any other form. They may be administered either by the mouth, or, in case of spasm closing

the teeth, or the patient being refractory, in the form of clyster, the dose being doubled in the latter instance.

Gum-resins are likewise applied externally, owing to their rubefacient powers, in the form of liniments or plasters, in spasmodic and rheumatic affections, and also to assist in dispersing indolent tumours.

Gum-resins should be kept in cool well-closed places, to prevent the evaporation of their volatile principles.

GUMBINNEN. [KÖNIGSBERG.]

GUMS. [DENTITION, DISEASES OF.]

GUN. In the articles ARMS, ARTILLERY, and CANNON, many kinds of fire-arms are noticed. The present article relates chiefly to the manufacture of muskets or fowling-pieces.

Birmingham is and has been for more than a century the chief centre of this manufacture. More than five million pieces of fire-arms were made in that town between 1804 and 1818. Yet there are no gun-factories, properly so called. The same gun travels about from factory to factory, from shop to shop, before it assumes its finished form. The most essential part of a gun is the *barrel*. The interior of the barrel is usually a smooth cylinder, but the exterior is made slightly conical by thickening the metal at the *breech* or hinder end. The commoner barrels are formed of tenacious soft iron, which is rolled into the form of flat bars, called *skelps*, each of which is sufficient to form a single barrel. The length of a skelp is usually about three feet, and the breadth about four inches at one end, and two and a half at the other. In welding these skelps into barrels, the thicker end is heated to redness, and hammered upon a hollow cavity in an anvil until the edges are turned up. A mandril being then inserted in the concavity between them, the edges are turned over and welded together. The skelp is thus gradually converted into a tube or barrel, after many beatings and hammerings. This laborious process of welding is now to a great extent superseded by improved methods. In one of these methods, the barrels, instead of being formed of skelps forged to the length of the barrel, are made from slabs of refined bar-iron, ten or twelve inches long, and weighing from 10 to 11 lbs. Each slab, by being heated and passed between rollers of a peculiar shape, is bent round into a tubular form; and repeated drawings between other rollers weld the two edges firmly together, and at the same time elongate the tube to the proper dimensions, a mandril being placed inside to preserve the bore of the barrel. The above processes are for *plain* barrels. *Twisted* barrels are made of long and very narrow strips of iron; one of which, being moderately heated to increase its pliancy, is wrapped spirally round a cylindrical mandril, in such a way as to form a tube, which may be slipped off the mandril at pleasure. As the rods are not usually made of sufficient length for one to form a barrel, several are usually joined end to end, those which form the breech being thicker than those at the muzzle end. By heating and hammering, these pieces are welded into a continuous and very strong and tough tube. Partially worn or 'scrap' iron is preferred for these purposes. The twisted barrels, technically termed *wire-twist* are formed of narrow rods of compound metal, composed of alternate bars of iron and steel forged into one body, and then rolled out to the requisite tenuity. *Damascus* barrels are composed of similar metal, but the rods are twisted upon their own axes until their component fibres have from twelve to fourteen turns in an inch, and the rods are thereby doubled in thickness and proportionately reduced in length. Two such rods are welded together side by side, their respective twists being reversed. The varieties in the modes of making twisted barrels are very numerous.

After welding, the barrels are carefully examined, and, if needful, straightened by a few blows of the hammer. They are then bored in a machine with an angular plug of tempered steel, which is caused to revolve rapidly within the barrel, a stream of cold water being directed upon the outside to check the heat generated by the excessive friction of the tool. The outside is brought to a smooth surface either by grinding on a large grindstone or turning in a lathe. The breech end of the barrel is tapped with a screw-thread, to receive the breech-plug, which closes it at that end.

The barrels are then ready for *proving*, which consists in firing them in a building in which their explosion can do no harm, with a charge four or five times as great as they will have to bear when in use. A great number of barrels are fired at once, by laying them upon a strong framework of wood, with their touch-holes downwards, and connected with a train of powder which is conducted outside the building, within which is laid a heap of sand to receive the bullets. They are then carefully examined, and such as show any defect are returned to be reforged, after which they must be proved again, while such as have stood the test satisfactorily are stamped with a distinguishing mark.

Sporting guns are often made with two barrels fixed side by side upon one stock. Such barrels are made separately, and have their adjacent sides filed flat, in order that they may lie close together. They are secured together by ribs running between them from end to end.

The wooden *stock* upon which the barrel is mounted is most commonly made of walnut-tree. When the shaping of the stock is completed, it is shod with brass, the trigger-guard and other metallic fittings and ornaments are let into the wood, and every part is fitted with suitable screws and fastenings, after which the whole is taken to pieces; the woodwork is finished by staining and polishing, the brasswork is filed and polished, and the barrels are sent to be finished, which is done in various ways. Most barrels are now *bronzed*, by the application of some chemical liquid aided by heat. Until a comparatively recent period all military guns, and most of those used for sporting purposes, were made with flint-locks, in which the ignition of the priming-powder was effected by the sudden stroke of a wedge-shaped flint against a piece of steel, by which a stream of sparks was directed into the pan containing the priming. But *percussion caps*, containing

an explosive powder, are now generally used. The fulminating substance is usually placed in a small copper capsule resembling a thimble in shape, which fits on to the nipple of the touch-hole, and, if not blown to pieces by the explosion, is removed previous to reloading. The hammer is provided with a shield to prevent any fragments of the copper cap from flying against the face of the shooter.

GUN-COTTON. [COTTON, GUN.]

GUN-METAL. [BRONZE.]

GUN-SHOT WOUNDS. Under this head writers on military surgery have usually considered not only all the injuries produced by cannon-balls, bullets, &c., striking against the body, but those which arise from the projection of stones, splinters of wood, and other substances broken off and thrown about by heavy balls, or by the explosion of shells, &c. The former are alone properly included in this term.

When a shot strikes the body; it seldom produces much, if any, immediate pain; a slight pricking sensation is felt, but the wounded man becomes aware of the injury only by his inability to move the part, or by feeling a little blood trickling over the adjacent sound skin. Whole limbs are known to have been shot off without the consciousness of the individual when in the heat of action. Sometimes, when discovered, the injury produces but little effect on the system: the courage and intellect remain unaffected; the pulse and respiration unaltered. Most frequently however, if the injury be at all severe, it is followed by intense depression; the man becomes deadly pale, and is covered with profuse sweat; he trembles, and imagines death instantly at hand; he has shivering, nausea, and sickness, and remains unconscious of pain from his wound, a sign always to be regarded with apprehension. These symptoms may soon subside if stimuli be given, but if they continue unabated for some hours they afford strong reason to fear that some important organ has been deeply injured. If the heart or the brain be struck, the man is often seen to leap from the ranks into the air, and fall at once dead.

A part may suffer seriously from a shot without the skin being injured. These cases were long considered by surgeons (as they are still popularly) to be owing to the wind of the ball, that is, to the impulse of the air, set in motion and compressed by its swift passage. The real cause of this kind of injuries is, that the ball, whose force has perhaps been somewhat spent by the obstacles it has previously met with, strikes the part obliquely, and therefore with only a small part of its surface, so that the force applied is not sufficient to break through the skin, which is not only remarkably tough and elastic, but, being placed on soft tissues, which serve it as a kind of cushion, will yield considerably without tearing, and thus slant the ball off in another direction. The muscles and other tissues beneath it however, being compressed between the ball and the bones, are more or less broken; there may be only a common bruise produced, but frequently the parts are found completely disorganised, broken up into a pulp with the blood effused from the vessels (often of considerable size) that have been ruptured, and sometimes even the adjacent bones are split and broken into fragments. If the ball penetrates the skin, a ragged opening with its edges inverted, and appearing somewhat smaller than the ball itself, is seen where it entered. The part around has a blueish or black colour from the bruise, and the cellular tissue in the track is seen black and dead. If it has struck a part perpendicularly, the ball will most likely enter into it straight; but, if it have struck obliquely, it may be altogether slanted off, as in the preceding cases, or at least its course through the skin will be made more oblique, so that it will fall on the subjacent muscles at a still more acute angle than it did on the surface of the body. Its force too being somewhat expended, it will be the less likely to penetrate the dense fascia which usually covers them; and hence it is often found to have run for a considerable distance beneath the skin, till its force is completely spent, or till, meeting with a greater obstacle to its course onwards than outwards, it passes through the skin again, at a part considerably distant from that at which it entered.

When the ball passes quite through the part, the aperture by which it makes its exit has characters just the reverse of those which we have mentioned as belonging to that by which it entered. Its edges are everted, it looks somewhat larger than the ball, and it is less bruised. In these cases no foreign body may be found in the track of the wound, which is generally less circuitous than in the preceding class.

Lastly, a part of the surface, or of the whole substance of a limb, or of the trunk, may be completely shot off, either by one large ball, or by a whole charge of small shot. The surface thus left is uneven, ragged, and bruised, the vessels and nerves lie exposed, or hanging out, the bone protrudes, and is often split up, even to the next joint.

Gun-shot wounds partake of the natures at once of penetrating, lacerated, and contused wounds, and they present the characters of all these in an extreme degree of intensity, from the velocity with which the ball, ill fitted by its shape for penetrating, has been propelled. The general rules of treatment are however the same as for similar injuries from common causes, but there are some specialities requiring attention. If, on examination of the wound (which should be made as much as possible with the finger), the ball and the substances it has carried in with it be felt tolerably moveable, and in a part where forceps can be easily applied, they should certainly be at once extracted, and sometimes it will be advisable to dilate the wound by incisions along its sides for this purpose.

It has been already said that the ball may pass through a part, and lodge just beneath the skin of the opposite side, or that, after a circuitous course, it may be found under the skin at a distance. In either case, if it can be felt, even at the distance of an inch below the surface, it should be cut down upon and removed. If the ball or other substances be not extracted at first,

and remain fixed after the sloughing and suppuration, no further attempt to remove them should be made till the inflammation that has supervened is fairly subdued: then, if much irritation continues to be excited, if abscesses form about its track, and much constitutional disturbance is produced, it may be necessary to use every effort to find out their seat, and if possible remove them.

Whether the ball be extracted or not, the simplest possible dressings should be at first applied; a piece of linen spread with some mild ointment, fixed on lightly by strips of adhesive plaster, and covered by a rag kept constantly moist with cold water, or simply lint dipped in cold water covered with oil-skin, are the best and most comfortable applications.

The question of amputation, when that operation is applicable, must be decided as in common cases by the character of each; no general rule can be given except that amputation will be advisable in many cases in military practice in which, in civil practice, it would be scarcely justifiable.

Secondary hæmorrhage not unfrequently ensues, when the parts around the track of the wound slough by ulceration of the larger vessels injured by the ball. The bleeding vessel must, if possible, in this case, as well as if it is observed at the first receipt of the injury, be at once cut down upon, and tied both above and below the opening.

(John Hunter, *Treatise on the Blood, Inflammation, and Gun-Shot Wounds*, in 'Works,' by Palmer, vol. iii., 1837; Larrey, *Mémoires de Chirurgie Militaire*, 4 vols. 8vo., 1812; Guthrie, *On Gun-shot Wounds of the Extremities*, 1 vol. 8vo., 1815; John Hennen, *Observations on some Important Points of Military Surgery*, 1 vol. 8vo., 1818.)

GUNNERY is that branch of the art of war which comprehends the theory of military projectiles, and the manner of employing ordnance in the attack and defence of fortresses or positions.

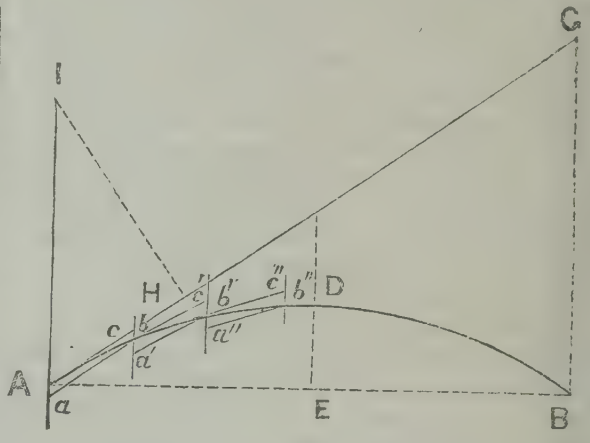
The first application of gunpowder to the purpose of discharging balls from cannon appears to have been about the year 1366, when it is said that some Germans brought to the Venetians, who were then besieging Claudiafossa, a town now called Chioggia, two small pieces of artillery with a supply of powder and leaden balls, by the aid of which they soon made themselves masters of the place. The discovery of the composition is supposed to have been made by Schwartz about 30 years previously. It should be observed however that Roger Bacon described, in 1270, a composition of the same nature, and that both the Hindoos and Chinese are supposed to have used it at a much earlier epoch.

Tartaglia appears to have been the first mathematician who wrote on the motion of balls when projected from fire-arms, and in his 'Quæsiti et Inventione Diversi,' which was printed at Venice in 1546, he investigates a few particulars concerning that kind of motion. In 1638 Galileo published the 'Dialoghi delle Scienze Nuove,' in which, together with his investigations concerning the

composition of motions in general, he shows that a shot projected from a gun describes a parabolic curve. He expressly says however that this curve would be described by the shot if it were not resisted by the air, and he proposes a method of finding the effects of that resistance.

The parabolic theory, as it is called, is of small importance as a guide to the practical artillerist; yet, as it is a step to the investigation of the real trajectory of the shot, it will be proper to give a demonstration of the fundamental proposition, and exhibit a few of the principal deductions which are usually made from it.

Let AB represent a horizontal line on the ground,



and AG the produced axis of the gun at A; then, if Ac be taken on AG to represent the space which the shot would describe in that direction by the force of the powder in a small portion of time, and Aa, or cb, the space through which the shot would descend by gravity in the same time; by the theory of the composition of motions, the shot would describe the diagonal Ab in the same time, and Ab may be taken to represent the velocity at b in the path. Producing Ab and making bc' equal to Ab, the line bc' will represent the space which would be described by the shot in an interval of time equal to the former, if the action of gravity were to cease; then if we make ba', or $c'b'$, equal to Aa, to represent the deflection caused by gravity in this next interval of time, the shot would evidently describe the line bb' in the same time; and this would represent the velocity in the path at the end of the second interval. Therefore producing bb', making $b'c''$ equal to bb', and proceeding as before, we should have a series of points A, b, b', b'', &c., in the path of the shot; which, being considered as a curve, the several lines Ac, bc', $b'c''$, &c., would become tangents at those points.

On account of the equality of the lines Ab and bc', bb' and $b'c''$, &c., respectively, it is evident that the parallel vertical lines passing through A, b, b', b'', &c., will be equally distant from each other; and, as the deflections which are produced by the action of gravity in equal times are equal to each other, we have also cb, $c'b'$, $c''b''$ equal to each other, which is a known property of the parabola. And thus the trajectory of the shot is proved to be that species of curve.

The tangential spaces Ac, bc', $b'c''$, &c., being, by hypothesis, described in equal times, they may

be taken to represent the velocities of the shot at the points A, b, b', &c., in the curve; and these being resolved in directions parallel and perpendicular to AB will give the velocities of the shot in the horizontal and in the vertical directions respectively at the same points. It is evident from the equality of the distances in directions parallel to AB, between the vertical lines passing through A, b, b', b'', &c., that the horizontal velocities will be the same at every point in the trajectory.

The initial velocity of the shot and the angle BAG, or the elevation of the gun being given, if the vertical line AI be taken to represent the height due to the initial velocity, and IH be drawn perpendicularly on AG; on making AG equal to 4AH, and drawing GB perpendicularly on AB, the length of the line AB will express the extent of the range. This will be a maximum, the original velocity being given, when the angle BAG is 45°; and it is evident that to every other range there will correspond two angles of elevation, of which one will exceed 45° as much as the other falls short of it. The whole time of flight is equal to that in which a body would descend by gravity through a height equal to GB.

The following circumstances relating to the path of the shot is proved by writers on Dynamics:— 1. With equal initial velocities, the ranges are proportional to sin. 2BAG, or the sine of twice the angle of elevation. 2. In the same case, the greatest height ED varies with sin. 2BAG. 3. When the elevations, BAG, are the same, the ranges are proportional to the squares of the initial velocities. 4. The times of flight vary with the sines of the angles of elevation. The theory of the motions of projectiles would therefore be abundantly simple if it were permitted to neglect the effects produced by the resistance of the air during the flight of the shot; but, in fact, when high charges of powder are employed, the trajectory bears no resemblance to any other kind of curve, and can only be expressed by equations of a transcendental nature.

It was reserved for Newton to develope the true laws of the resistance experienced by bodies moving in fluid media, and to make a near approach to the form of the curve described by a projectile in the air; and, in a scholium to Principia,' prop. 10, lib. ii., he explains that the path described in a uniformly resisting medium is a species of hyperbola having the asymptote of the descending branch in a vertical position.

In complete treatises of Dynamics there are given, on the supposition that the resistance of the medium varies with the square of the velocity, differential equations for the horizontal and vertical co-ordinates of any point in the curve, and also for the time of flight; but the integrations can be effected only by the method of quadratures. (Poisson, 'Traité de Méçanique,' tom. i. art. 211.) When the angle of elevation is very small, less than 5° or 6°, the equation of the curve becomes

$$y = \left\{ \text{tan. E} + \frac{1}{4ch \text{ cos.}^2 \text{ E}} \right\} x + \frac{1}{8c^2h \text{ cos.}^2 \text{ E}} (1 - e^{2cx}) \quad \ldots \quad (a)$$

in which E is the angle of elevation, corresponding to B A G,

h is the height due to the initial velocity,

$e = 2.71828$, the base of the hyperbolic logarithms,

c represents $\frac{n\varrho}{\mathrm{D}r}$; in which D is the density of the shot, ϱ that of the air, r the semidiameter of the shot, and n is a number to be determined by experiment; it may be assumed equal to 0.225.

x and y are horizontal and vertical co-ordinates of any point in the curve.

By substituting in this equation any assumed values of x, we should obtain the corresponding values of y; and thus the form of the trajectory would be determined approximately. But, if the object is to obtain merely the horizontal range, make $y = 0$ in the equation; then the latter will, after reduction, become

$$e^{2cx} - 1 = (4c^2h \text{ sin. } 2\,\text{E} + 2c)\, x.$$

Substituting, in this equation, different numbers for x, that which renders the two members equal to one another will express the required extent of the range.

What is called the point-blank range is the distance from a point on the ground, vertically under the chamber of the gun or howitzer, to the point at which the shot strikes the ground after the discharge, the axis of the bore being supposed to be in a horizontal position, or parallel to the ground if the latter should be inclined to the horizon. The extent of such range may be determined from the equation (a) by making E = o and considering y as negative. In this case that equation becomes, after transposition,

$$e^{2cx} - 1 = 2cx + 8c^2hy;$$

in which y is the height of the gun above the level of the spot on which the shot falls. In this equation, substituting for x different assumed values, that which renders the two members equal to each other will be the required range.

The *but-en-blanc* of the French is frequently called the 'line of metal range,' and signifies the distance from the chamber of the gun to the point where the trajectory of the shot crosses (the second time) a line joining the tops of the base, and muzzle rings, and produced. Here the axis of the gun, which is always a tangent to the trajectory at the nearest extremity, makes a small angle with the said line, depending on the dispart, or the difference between the semidiameters of the gun at the base and muzzle.

The time t of flight is given by the equation

$$t = \frac{e - 1}{c\sqrt{2gh} \text{ cos. E}},$$

in which g (= 32.2 feet) denotes the force of gravity. From which equation, on substituting the value of x (the horizontal range), which is supposed to be given, the time t of the flight of the projectile will be obtained.

It may be observed here that a knowledge of the time during which a shell will describe its

trajectory is of great importance, since it enables the gunner so to regulate the length of the fuze, that the shell may explode nearly at the moment that it has reached the object which it is intended to destroy.

Note.—In determining the trajectory, the range, and the time of flight, by the above formulæ, the operations must be performed by the aid of logarithms.

From Dr. Hutton's investigations (Tract xxxvii. art. 160), and experiments, it appears that the initial velocities of shot are directly proportional to the square roots of the weights of the charges, and inversely proportional to the square roots of the weights of the shot (the guns being similar); and Dr. Gregory gives for the initial velocity in feet the formula

$$v = 1600\sqrt{\frac{3\acute{\omega}}{\omega}},$$

in which $\acute{\omega}$ is the weight of the charge, and w is that of the shot, the coefficient 3, of $\acute{\omega}$, holds good only when the windage is 0.233 inch; when the windage is less, that coefficient should be greater.

When the centre of gravity and the centre of oscillation, in a Ballistic pendulum have been found mechanically, the formula

$$v = \frac{\mathrm{M}\,a}{m\,p} V\,l$$

will give the velocity v of a shot at the moment of striking the pendulum: in this formula

m = weight of the shot.
M = sum of the weights of the pendulum and shot.
$a, p, l,$ = distances from the centre of suspension to the centre of gravity, the point of impact, and the centre of oscillation, respectively.
V = the velocity acquired by the centre of oscillation when the pendulum has descended from the point of greatest recoil to a vertical position.

Dr. Hutton has investigated (Tract xxxv. art.ii. 79), a formula by which the velocity lost in passing through a given distance in air may be determined.

From Dr. Hutton's experiments it was found that the resistances experienced by a shot in passing through the air are in rather a higher ratio than the squares of the diameters of the shot. It was found also that there is a gradual increase in the exponent of the resistance as the velocity increases, probably on account of the partial vacuum behind the ball. When the motions were slowest, the resistance was nearly proportional to the square of the velocity; and, when the shot moved at the rate of 1500 feet per second, that exponent seemed to have attained its maximum, the resistance being then nearly as the $2\frac{1}{8}$ power of the velocity. Beyond that rate of motion the exponent of the resistance gradually decreased.

The term cv^2 (c having the value given to it in equation (a)) denotes the retardative power arising from the resistance of the air on a body, as a shot, moving with the velocity v; and, if this be made equal to g, the force of gravity, we have

$$v = \sqrt{\frac{g}{c}}:$$

this is called the terminal velocity, or that constant velocity with which the shot would descend in air when the resistance of the latter becomes equal to the accelerative power of gravity; and it follows that $\frac{1}{2c}$ is the height due to the terminal velocity. The terminal velocity of a shell is less than that of a shot, because its weight, with equal diameter, is less: the ratio of the weight of a solid to that of a hollow shot being as 1.42 to 1 nearly, the formula for the terminal velocity of a shell is

$$v = \sqrt{\frac{g}{1.42\,c}}.$$

From experiments which were carried on at Deal, in 1839, with iron ordnance and solid shot, an extensive series of ranges was obtained, of which the following Table contains some of the more important.

Ordnance.	Charge.	Point Blank.	Ranges at the subjoined elevations.					
			1°	5°	6°	8°	10°	15°
	lbs.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.
32-pounder	8	556	862	1939	...	...	...	3515
42-pounder	14	...	...	...	2381	2735	3080	
56-pounder	17	...	...	...	2523	2958	3118	

The windage of all the above guns was .175 inch; and the greatest range obtained was 5720 yards; this was from the 56 pr. gun at an elevation of 32°. The service charges, in terms of the weight of the shot, are:—

For brass and iron guns . $\frac{1}{3}$
For brass howitzers . . $\frac{1}{9}$
For carronades . . . . $\frac{1}{12}$

From the results of the ricochet practice at Woolwich in 1821, it appears that at a range of 400 yards, with a weight of powder equal to $\frac{1}{32}$ of the weight of the shot, about two-thirds of the rounds took effect: at 600 yards, with charges from $\frac{1}{32}$ to $\frac{1}{20}$, from one-half to one-third took effect; and at 800 yards, with charges from $\frac{1}{24}$ to $\frac{1}{12}$, from one-third to two-fifths took effect. It is hence concluded that ricochet batteries should, if possible, be at distances between 400 and 600 yards from the object: at a greater distance much of the ammunition would be uselessly expended. Also that, with both shot and shells, the best elevation for enfilading a work is from 6° to 9° above the crest of the parapet of the work.

Practice with a 10-inch mortar, Sutton Heath, 1811. The elevation = 45° and the weight of the shell = 96 lbs.

Charge in lbs.	Time of Flight.	Range in yds.
1 lb.	10″	448
1½lb.	12	774
2	16	1317
2½	18	1605
3	19	1895

Practice with a French 12-inch mortar, Toulon, 1830. The elevation = 45° and the weight of the shell = 162 lbs.

Charge.	Time of Flight.	Range in yds.
5lb. 6 oz.	20″	1631
10 13	28½	2579
16 3	32½	3301
21 10	36¼	3872
27	39½	4368

The effects of shot in penetrating any material form a subject of great importance in military engineering, as a knowledge of those effects can alone afford data for constructing walls and roofs capable of resisting the momenta of the vast masses which, during a siege, may descend upon or be projected against them. Now, by Dynamics, when the resisting material is the same, if the depth penetrated be represented by s, the semidiameter of the shot by r, the velocity at the time of impact by v, and the density by D,

s varies with rv^2D;

and when shot of the same specific gravity is used

s varies with rv^2.

The volume of the space penetrated is considered as proportional to the *vis viva*, or active force of the shot, that, is to r^3v^2D.

In Sir Howard Douglas's 'Treatise on Naval Gunnery' there are recorded the following results of experiment on the penetration of an 18-pounder shot into a butt made of beams of oak; viz. with charges of 6lbs., 3lbs., 2½lbs., and 1lb., the depths of the penetrations were 42 inches, 30 inches, 28 inches, and 15 inches respectively; the velocities are 1600 feet, 1130 feet, 1024 feet and 656 feet respectively; and from these data the mean value of F will be found to be 138,701. This number expresses the resistance of the oak, in pounds, against a surface equal to the area of a section through the centre of the shot; and, by reduction, it becomes equivalent to 912190 pounds.

Similar experiments made at Metz by firing 24-pounder shot against butts of fir (the numbers being reduced to English denominations) gave 475070 pounds for the resistance exerted on a square foot.

At Woolwich, in 1835, two 24-pounder shot were fired with a velocity of 1390 feet per second against a wall of concrete, into which they penetrated to the mean depth of 3 feet 10 inches; whence, by the above formula, we have F=188047 pounds; and, consequently, the resistance on a square foot is equal to 1013730 pounds. From a like experiment made at Metz it was found that the resistance opposed by a wall of oolitic stone might be expressed by 1394800 pounds (English) on an equal surface.

The ordnance in use for the British service are as follow:—

Iron Guns; 68, 56, 42, 32, 24, 18, 12, 9 and 6 pounders; besides 10-inch and 8-inch guns for shells or shot.

Carronades; 68, 42, 32, 24, 18, 12, 9 and 6-pounders.

Mortars; 13-inch, 10-inch, 8-inch, 5⅕-inch, and 4⅖-inch.

Howitzers; 24 and 12-pounders; besides others of 10-inch and 8-inch calibres.

Brass guns; 24, 12, 9 and 6-pounders.

In 1824, the French introduced what are called *canons à bombes* in their naval service. These are of two kinds: one of them is said to be capable of projecting solid shot weighing 89 lbs., or hollow shot weighing 57 lbs.; the other projects shot weighing 36 lbs. Soon after that time the 10-inch and 8-inch guns were executed for the British navy: the 8-inch gun is now very generally provided for large ships of war and steamers, for the purpose of projecting hollow shot and even *live* shells (shells charged with powder, for bursting).

GUNPOWDER, a composition possessing great explosive power. The date of its invention is involved in obscurity. It has been said that it was used in China as early as the year A.D. 85, and that the knowledge of it was conveyed to us from the Arabs on the return of the Crusaders to Europe; that the Arabs made use of it at the siege of Mecca in 690; and that they derived it from the Indians. Roger Bacon has been supposed to allude in an enigmatic way to the composition of explosive force of gunpowder; and about 1336 Berthold Schwartz, a monk, is said to have also discovered the mode of manufacturing it.

Gunpowder consists of a very intimate mixture of nitre, or nitrate of potash, charcoal, and sulphur. The proportions vary; but they generally consist of about 6 parts of nitre to 1 of charcoal and 1 of sulphur. The ingredients must be of the greatest attainable purity; and the nitre is fused before use. The charcoal, either of alder, willow, or dogwood, is prepared in iron retorts; and the sulphur is the volcanic kind imported from Sicily, and is refined by melting or subliming.

When the ingredients are prepared, they are separately ground to a fine powder, and mixed in the proper proportions. The composition is sent to the gunpowder-mill, which consists of two stones vertically placed, and running on a bed stone. On this bed-stone the composition is spread, wetted, and ground, and is then taken off and sent to the corning-house to be corned or grained; here it is first pressed into a hard and firm body, broken into small lumps, and the powder grained by these lumps being put into sieves in each of which is a flat circular piece of lignum vitæ. The sieves are made of parchment skins, having round holes punched through them; several of these sieves are fixed in a frame, which by machinery has such a motion given to it as to make the runner in each sieve go round with velocity sufficient to break the lumps of powder, and force them through the sieves, forming grains of several sizes. The grains are separated from the dust by proper sieves and reels; they are then hardened, and the rougher edges taken off by being run a sufficient length of time in a close reel, which has a proper circular motion given to it.

The gunpowder, thus corned, dusted, and reeled, is sent to the stove and dried, care being taken not to raise the heat so as to dissipate the sulphur. The heat is regulated by a thermometer.

The theory of the action of gunpowder is this: That particle of it on which a spark falls is immediately heated to the temperature of ignition; the nitre is decomposed and its oxygen combines with the charcoal and sulphur, which are also heated; this combination extricates as much heat as is sufficient to inflame successively, though rapidly, the remaining mass. The cause of the expansive force of gunpowder is the production of carbonic acid, carbonic oxide, and nitrogen; and, these being liberated at a very high temperature, the effect is greatly increased. The firing may be effected by the electric spark, and also under some circumstances by percussion.

In ascertaining the goodness of gunpowder, which is done by determining its strength, an *éprouvette* is employed to measure its projectile force. This is a small strong barrel, in which a given quantity of the powder is fired, and the comparative expansive force is measured by the action exerted on a spring or weight.

GUNPOWDER-PLOT. [FAWKES, GUIDO.]

GUNST, PIETER VAN, Dutch portrait engraver, was born at Amsterdam about 1667. He engraved a set of ten full-length portraits, after Vandyck, from drawings made in England in 1713 by Arnold Houbraken. He also engraved a set of portraits after Vander Werff, for Larrey's 'History of England;' and he engraved the portrait of Franciscus Junius, after Vander Werff, which is inserted as a frontispiece to the 'Pictura Veterum,' Rotterdam, 1694. His works are extremely neat in execution, especially the heads. Among his historical or figure pieces, which are inferior to his portraits, are nine Loves of the Gods, after Titian. The date of his death is not known.

GUNTER, EDMUND, was born in the county of Hertford, but of a family originally from Gunter's Town, in Brecknockshire. He was educated on the royal foundation at Westminster School, and elected from thence to Christchurch College, in Oxford, in the year 1599, being then eighteen years of age. He invented the sector, and wrote the description and use of it in Latin. He was appointed professor of astronomy in Gresham College, March 6, 1619. He died on the 10th of December, 1626, about the 45th year of his age.

Gunter's writings (the 'Canon Triangulorum' excepted, which is a table of logarithms) consist almost entirely of a description of graphical methods of constructing problems in trigonometry, navigation, &c. He was the first who laid down a logarithmic scale upon wood, and used it for the purposes of the draughtsman. This scale is still used, and goes by his name. The common chain used by surveyors also goes by his name. The first observation of the variation of the compass is due to Gunter.

Gunter is the first who introduced the words cosine, cotangent, &c. in place of sine of the complement, &c. In the preface of the 'Canon,' he speaks of the 'sine of the complement, which in one word may be called the cosine,' as if he were introducing a new word. There is also the testimony of Briggs ('Arith. Log.,' cap. 13) that Gunter suggested to him the use of the arithmetical complement. Whatever, in short, could be done by a well-informed and ready-witted person to make the new theory of logarithms more immediately available in practice to those who were not skilful mathematicians was done by Gunter.

GUNTER'S SCALE. [SLIDING RULE.]

GUNTOOR. [HINDUSTAN.]

GURWAL. [HINDUSTAN.]

GUSTAVUS ERICKSON, commonly called *Gustavus Vasa*, a descendant of the ancient Swedish kings, was born May 2, 1490, at Ockestadt, near Stockholm. The independence of Sweden, which had been recovered by a successful insurrection, being again lost through the success of the Danes, Christian the Danish monarch caused himself to be crowned king of Sweden. Before his coronation he promised to release all prisoners, and to maintain the rights and freedom of the Swedish nation; but within three days after, on Nov. 8, 1520, he violated his promise, by ordering the chiefs of the most respectable Swedish families, and also the members of the senate, to be arrested, and afterwards beheaded in the market-place. Thus perished in one day eighty-four persons, all belonging to the first families, and among them the father of Gustavus Vasa. The Danish troops then rushed upon the unarmed multitude, and massacred all who fell into their hands, without distinction of age or sex. These executions were continued for several days. In the meantime young Erickson had escaped the prison where he had been confined, and fled to the mountains of Dalecarlia, where he could obtain neither food nor shelter from the peasants, who feared the threats of Christian. He wandered about the country half dead with cold and hunger, but succeeded in obtaining employment for a short time as a labourer. He was soon recognised, and in danger of being betrayed and taken. At length, after a variety of adventures and some narrow escapes, he succeeded in reaching Rattwik in safety.

Here Gustavus began his preparations for his great undertaking. With unwearying zeal he went from house to house, and from hut to hut, and soon found himself surrounded with a number of resolute combatants. With this force he marched towards Stockholm. His forces increased with each step, and in May 1521 Erickson was at the head of 15,000 men. Victory crowned the arms of the Dalecarlians, to whom the inhabitants of the plains of Sweden quickly united themselves. At length, after various vicissitudes, Stockholm fell into the hands of Gustavus, and Christian was forced to withdraw to Denmark. The nation which he had freed offered Gustavus the crown of Sweden, but he declined to accept sovereignty. Under the title of Stadtholder however he conducted the government of Sweden. But the adherents of the Catholic party and the expelled king of Denmark still continued to disturb the country by their intrigues, and the Swedes, in order to obtain peace

and security, again solicited Gustavus to ascend the throne; and in June 1527 he was solemnly crowned king of Sweden, and became the founder of a new dynasty.

Gustavus Vasa reigned in Sweden upwards of thirty-three years. During this long period he displayed such virtues and talents for government, that he acquired fresh and imperishable claims upon the gratitude of his country.

GUSTAVUS ADOLPHUS, king of Sweden, was born on Dec. 9, 1594. He was the sixth monarch of the dynasty of Vasa. His father, Charles, had been declared king of Sweden to the exclusion of Sigismund, the heir of the elder line of the house of Vasa. Charles died October 30, 1611, leaving the Swedish sceptre to his son, then in his seventeenth year. As long as Charles lived, Sigismund never ventured to renew his claims to the crown of Sweden; but, upon his death, he invaded Sweden, and laid claim to the crown for his son Ladislaus, then a minor; but Gustavus fought successfully against the Czar of Russia, the ally of Sigismund, and also against Sigismund himself, until, by the mediation of England and Holland, a peace was concluded in 1629, upon the most advantageous terms for Adolphus. Gustavus next declared war against Austria, his principal motive being to protect the oppressed German Protestants, notwithstanding that the ground of quarrel alleged in his declaration was the enmity shown to Sweden by Austria, and the violation of her territories.

Gustavus landed in Pomerania on the 24th June, 1630, with not more than 8000 men. He made himself master of the islands of Usedom and Wollin, and pressed Bogislav, the duke of Pomerania, so warmly, that he was compelled to agree to a treaty by which the town of Stettin was put in possession of the conqueror, and the whole country placed at his disposal.

The army of Gustavus was reinforced by six Scottish regiments, under the conduct of the Duke of Hamilton, and he provided himself with money by raising a contribution of 50,000 rix-dollars in Pomerania. After several other successes, he divided his force into four parts. One division, under the Duke of Lauenburg, was ordered to the relief of Magdeburg; General Bauditz was sent to make an attack upon Kolberg; Horn was left with a garrison in Stettin; and Gustavus himself encamped at Ribbenitz in the duchy of Mecklenburg. While lying there, he received a letter written by the Emperor Ferdinand, containing proposals for peace, in which he made the most advantageous offers to the Swedish king, including the possession of Pomerania. Gustavus rejected these proposals, and continued to make himself master of the towns and fortresses of Pomerania and Mecklenburg. By the end of February 1631, in the course of only eight months, he had already taken eighty fortified places; but the towns of Rostock and Wismar yet remained in the hands of his enemies. The emperor sent against him Field-marshal Tilly, at the head of the Imperial army. The army of Gustavus pressed forward into the heart of North Germany, gaining continual victories, and on Aug. 1, 1631, encamped near Wittemberg, where Gustavus received Count Arnheim, the ambassador of the Elector of Saxony. A treaty was quickly concluded, by which the Saxon dominions were opened to the King of Sweden, and the whole military power of the electorate placed under his command; the elector to provide the army with ammunition and provision, and to conclude no peace with Austria without the consent of the King of Sweden. Gustavus then prepared to encounter Tilly, who had advanced against him to Eilmarschen. On the 7th September, 1631, they met on the plains of Leipzig. The force of the King of Sweden, to which the Saxon troops under Arnheim were joined, amounted to about 40,000 men; Tilly's army was somewhat more numerous. The victory was long doubtful; but at length Tilly's defeat was complete.

All Germany was now open to the Swedes, and Gustavus hastened forwards in an uninterrupted course of conquest. But the progress of the Swedish arms excited the jealousy and apprehension of the whole German population—even among the Protestants. Gustavus was also accused of having designs on the Imperial crown. His allies became lukewarm, and the inhabitants everywhere viewed the Swedes with dislike. Upon the defeat of Tilly at Leipzig, and the Saxon army making itself master of Bohemia almost without opposition, Ferdinand called in Wallenstein, who drove the Saxons out of Bohemia, and threatened Gustavus, who in the meantime had gained a second victory over Tilly, in which that general lost his life. Wallenstein took up a strong position in the neighbourhood of Nürnberg. In fruitless attacks upon the camp, and through hunger and disease, in the course of seventy-two days, Gustavus lost 30,000 men. At length Wallenstein moved towards Saxony, and on Nov. 1, 1632, he offered battle to his opponent at Lützen.

Gustavus opened the battle to the sound of music, with Luther's hymn, 'Eine feste Burg ist unser Gott.' He led the attack in person, descended at the critical moment from his horse, and killed the foremost of the enemy with a lance. While heading a second attack on horseback against the enemy's cavalry, a ball struck him from behind, and he fell. Duke Bernhard of Weimar crying out to the Swedes that the king was made a prisoner inflamed them to such a degree, that nothing could resist their impetuosity, and after a frightful carnage the enemy was forced to retreat. The Swedes gained a victory, but with the loss of their king. A strong suspicion of the crime of assassination rests upon his cousin the Duke of Saxe-Lauenberg.

Gustavus Adolphus married, in 1621, Maria Eleonora, the sister of the Duke of Mecklenburg, by whom he had one daughter, Christina, who was his successor.

GUSTAVUS III., king of Sweden, born in 1746, was the eldest son of Adolphus Frederic, duke of Holstein, who had been called to the Swedish throne in 1743. On the 12th of February, 1771, Gustavus III. succeeded to the crown on the death of his father. The country was at this time divided by two factions, the Hats and

Caps, as the aristocratic adherents to the Russian or French policy respectively called themselves. Gustavus took the bold resolution of subverting both these parties with the assistance of the people. The execution of the king's plans was commenced by the insurrection of the commandant of Christianstadt, who issued a violent proclamation against the States-General. Gustavus sent Prince Charles with a powerful force ostensibly to subdue the rebel, but in reality to unite with him. On the 19th of August, 1772, the king began to follow out his plans in person. He arrested the heads of the parties and the most powerful members of the States, and publicly announced his plans for the establishment of a new constitution. The next day the magistracy of the capital took the oaths of fidelity, and the States-General were invited to assemble. Gustavus entered the assemblage in order to submit to them the proposed new constitution. His armed force was apparently sufficient to subdue every scruple of the assembly, but, as the constitution only restricted and circumscribed the privileges of the nobility, and did not infringe the liberties of the citizens, it was received by the majority with real satisfaction, and confirmed by oaths and signatures. Those who had been arrested were immediately afterwards released, and the revolution was completed.

The nobility were silenced, but they nourished a secret hatred, which at length broke out in the year 1788, when they prevailed on the States to refuse the supplies while the king was engaged in a war with Russia and Denmark. In order to free himself from the ever-active intrigues of the nobles, the king, on April 3, 1789, caused the leaders of the opposition in the Diet to be arrested, and a law to be passed, by which the royal prerogatives were very considerably increased. After varying fortunes in the war, Gustavus concluded a peace on the 14th August, 1790, with his foreign enemies; but the nobility, who apprehended the loss of all their privileges, resolved upon his death. Accordingly they formed a conspiracy under the direction of Counts Horn and Ribbing, and Colonel Lilienhorn; and a nobleman, named Ankerstroem, undertook to murder him. Ankerstroem chose a masked ball, given on the 16th March, 1792, at Stockholm, as affording the fittest opportunity. The king was warned by some anonymous friend; but he went to the ball, and the assassin shot him through the body. The king suffered with much firmness, and died on March 29. His murderer was discovered and executed, and many of the conspirators were banished from the country.

GUSTAVUS IV., king of Sweden, was born Nov. 1, 1778, and ascended the throne on the 29th of March, 1792. This king displayed, while a prince, a capricious humour and an obstinacy that bordered upon madness. He entered into a negotiation for a marriage with the grand-daughter of the Empress Catherine of Russia, and the whole court was assembled in order to be present at the ratification of the marriage-treaty, when he departed secretly, and married a German princess of the house of Baden. Of all the European monarchs he was the most zealous partisan of legitimacy, and he proposed, as the great object of his life, the restoration of the dethroned family of the Bourbons to the crown of France. He involved his country in indescribable difficulties, irritated all his neighbours, and even offended England, his only ally, whom he certainly could not reproach with any friendly feelings towards Napoleon. Gustavus appears to have discovered that a storm was gathering about him, and in order to avert it he endeavoured to possess himself of the funds deposited in the bank of Sweden. At first he made an attempt to get the money by a loan of eighty-two millions of Swedish rix-dollars (about twelve millions sterling); but, as the bank commissioners refused to comply with this demand, he resolved to carry his plan into effect by force.

On March 29, 1809, he repaired to the bank, accompanied by a detachment of military, with the intention of taking possession of the money deposited there. By order of the Diet, a resistance was made, and the king arrested, and confined in an apartment, where he raged like a madman. On March 29 there appeared the decision of the Diet, by which Gustavus IV. and all his direct descendants were declared to have forfeited their right to the Swedish crown; and the Duke of Sudermania ascended the throne under the name of Charles XIII.

Gustavus left the Swedish territories. During his exile he assumed the name of Colonel Gustavson, and renounced all external observances that might remind him of his former rank. He refused the appanage which Sweden offered him, declined having any communication with his family, and obstinately rejected all assistance from them. He subsisted on the produce of his labours as an author, together with a little pension which he drew as a colonel.

He died at St. Gall, toward the end of the year 1837.

GÜSTROW. [MECKLENBURG.]

GUTENBERG, believed to be the first inventor of the art of printing with moveable types, whose real name was Johannes Gensfleisch, was born in 1397 at Sulgeloch, a village near Mainz. During his residence there he became implicated in an insurrection against the nobility, and was compelled to fly to Strasburg, where necessity compelled him to employ himself in mechanical occupations, and by accident he made the discovery so pregnant with future consequences. On returning to Mainz, Gutenberg experienced the hard fate that most great inventors have to endure from the misconceptions and ingratitude of mankind. The members of the Guild of Writers, together with the priests, persecuted him; his partners Fust and Schoeffer joined with his enemies against him; through litigation he was deprived of all his property; and once more he was forced to turn his back upon the ungrateful town. In the meantime Fust and Schoeffer pursued their business as printers, and thus reaped all the profit, while the inventor was wandering in exile. After many years Gutenberg returned to Mainz, where he died Feb. 24, 1468. His

statue in bronze was set up at Mainz a few years ago.

The 'Statuta Provincialia antiqua et nova Moguntina,' 4to., are thought to have been printed by Gutenberg, as well as two or three editions of Donatus, of which fragments only remain. Some have thought the Mazarine Bible to have been a production of his press.

GUTHRIE, WILLIAM, was born at Brechin, in the county of Angus, Scotland, in 1708. He was educated at the University of Aberdeen. He came to London, and became one of the most popular compilers of his day, and must have been one of the most industrious writers ever known, if he was the author of all the voluminous works to which his name is prefixed. Among them are a 'History of England,' 3 vols. fol.; a 'History of Scotland,' 10 vols. 8vo.; and a 'General History of the World,' 13 vols. But in the preparation of most of these works he is believed to have had little share beyond lending them his name. The well-known 'Geographical Grammar' which bears his name is believed to have been compiled by a bookseller in the Strand, of the name of Knox. To what he gained with his pen was, in course of time, added a pension from government. He died in 1770.

GUTHRY, HENRY, a Scottish ecclesiastic, was the son of John Guthry, clergyman of Cupar-Angus in Forfarshire, where he was born soon after the commencement of the seventeenth century. He studied at St. Andrew's, and was presented to the church of Stirling. In 1638 he subscribed the Covenant, but he is said never to have had much sympathy with its promoters. In 1647 he was one of those who joined the 'Engagement' for the support of Charles I. against the Parliament, which occasioned his deposition from the ministry. He was succeeded by a celebrated namesake, apparently a member of the same family, James Guthry, who, having shown a resolute hostility to Charles II., his followers, and his ecclesiastical polity, was beheaded for high treason in 1661. The more moderate or cautious Henry was then restored to the benefice. He conformed to the re-establishment of Episcopacy, and was appointed bishop of Dunkeld in 1665. He died in 1676, leaving behind him a MS. History of his Own Time, which was published in 1748. (*Life*, by George Crawford, prefixed to *Memoirs of Henry Guthry, late Bishop of Dunkeld.*)

GUTTA PERCHA is a gum which exudes from a tree growing in Singapore, Borneo, and other of the eastern islands. The first specimen seen in England was sent to the Society of Arts, London, in 1843, by Dr. Montgomerie. The first articles made of this substance in England were a lathe-band, a short piece of pipe, and a bottle case, which were presented to the Society of Arts in 1844.

There seem to be three varieties of this substance, named Gutta Girek, Gutta Tuban, and Gutta Percha. The word gutta means a gum which exudes from a tree; while percha (pronounced pertcha) is the Malayan name for the tree which principally yields this gum. The trees are forest trees, and the natives appear to tap the bark when and how they think they may obtain the largest supplies. The gum is brought to England in shapeless lumps, and is there wrought into the secondary forms of rods, tubes, blocks, sheets, strings, &c., preparatory to being manufactured for various useful purposes.

The articles now made of gutta percha are numerous and varied. The toughness of the material (differing somewhat from the elasticity of caoutchouc), and the facility with which it may softened by heat render it peculiarly apt to receive, and to maintain permanently, any form that may be imparted to it. Pressure in moulds, while the gutta percha is in a warm and plastic state, is one of the most convenient modes of giving it a determinate form. Whether wet or dry, its uses are confined to cold purposes, as it is very readily affected and thrown out of shape by heat. For many purposes, naphtha and other inflammable liquids act as cements and even solvents for the gutta percha. In its usual condition it is a brown substance, not much unlike very tough leather, but having a peculiar odour; its surface is, however, capable of being prepared so as to receive paint, gilding, japanning, bronzing, and other ornamental modifications. The crude substance, as brought to England, is reduced to a pulp by macerating machines, purified by water, combined with many different substances according to the purpose to which it is to be applied, and pressed into sheets or other forms by rollers; and familiar mechanical processes are then sufficient to work up this prepared material to the required forms.

Among the articles made of gutta percha are the following:—soles for boots and shoes; speaking-tubes, tubes for telegraphic wires, and water pipes; a stopping material for decayed teeth; lathe and wheel bands for machinery; reins and harness; whips, whip-thongs, fishing lines, nets, fishing floats, book backs and embossed covers, coarse printing types, ornamental mouldings, picture frames, copies of coins and medals, capes, leggings, umbrella covers, brush backs, drinking cups, engine buckets, cigar cases, powder flasks, surgical instruments, twine and sash lines, travelling cases, cricket balls, inkstands, ornamental trays, dog-collars, clogs, &c.

GUTTA SERE'NA is that kind of blindness which arises from derangement or disease of the nerves of the eye, whether before or after their separation from the brain. The name originated in a notion, long prevalent in the schools, that all diseases are attributable to some deleterious fluid or humour circulating in the blood or diffused in the substance of the part affected. The epithet *serene* was intended to intimate the comparative freedom from pain, and the absence of any unpleasant change in the appearance of the eye, which distinguish this class of ophthalmic complaints from others equally destructive of sight. Hence Milton, whose blindness was of this kind, thus addresses Light ('Paradise Lost,' iii. 22):—

> 'But thou
> Revisit'st not these eyes, that roll in vain
> To find thy piercing ray, and find no dawn;
> So thick a *drop serene* hath quenched their orbs,
> Or dim suffusion veiled.'

and, in the lines to Cyriack Skinner, he notices

both the external peculiarity and the cause (by far the most frequent one) of his blindness, as well as the occasional suddenness of its attack:—

> 'Cyriack, *this three years day* these eyes, *though clear*
> *To outward view of blemish or of spot*,
> Bereft of light, their seeing have forgot.'

But the rejection of the humoral pathology has been extended to the nomenclature derived from it; and this fanciful though still popular term, which seems to have been devised expressly for the poets, has given place in modern systems of nosology to that of *amaurosis* (ἄμαυρος, *blind*).

The most frequent seat of the complaint is the retina; the next is probably the brain itself, or that part of the optic nerve which, lying near the cranium, is in contact or communication with the brain, and partakes of its diseases. It may likewise be symptomatic of irritation in some distant organ. The temporary failure of sight during a bilious attack is of this nature. It is sometimes merely hysterical, in which case though the blindness may be total, it is rarely permanent; and the same remark may be made of a kind of amaurosis which occasionally results from the irritation of worms in the intestinal canal.

Confirmed amaurosis is seldom cured; but in its early stages much may be effected by careful and skilful treatment; and the means may generally be adapted with great precision to the nature of the case, by attentive consideration of its symptoms and history.

Depletion, aperient medicines, abstinence, and a darkened chamber, with mercury, must of course form a part of the treatment when the case is inflammatory: but, when the symptoms arise from exhaustion, an opposite plan of treatment is obviously proper.

GUTTI'FERÆ, or CLUSIA'CEÆ, form a small natural order of exogenous plants, inhabiting the hotter parts of tropical countries in both the Old and New World. Their fruit is succulent, juicy, and in many cases resembling a large apple or orange. The Mangosteen (*Garcinia mangostana*) is probably the most delicious of any known; but it has never been seen in a fresh state in Europe, for the tree will hardly exist out of its native humid heated atmosphere in the Indian Archipelago. In general the fruit of these plants is acrid and astringent, and quite unfit for food. The most remarkable product of the order is Gamboge, which is secreted by the branches of *Hebradendron Cambogioides*, and perhaps some other species. Others yield an astringent gum-resin, called Tacamahaca.

GUYA'NA, GUAYA'NA, or GUIANA, is the north-eastern portion of South America, extending from the banks of the river Orinoco southward to those of the river Amazon. It is bounded on the west by the Guaïnia or Rio Negro, the natural canal of Cassiquiare, and the middle course of the Orinoco. Its surface covers an area of more than 650,000 square miles, but more than five-sixths of it are included within the boundaries of the empire of Brazil and the republic of Venezuela, under which articles these portions are noticed. We limit the present description to those parts which comprehend the English, Dutch, and French settlements, and which may probably cover a surface of about 100,000 square miles. The boundaries between these settlements and the other two portions are only vaguely determined; but for the most part the districts drained by the rivers which fall immediately into the Atlantic Ocean belong to the European nations, while those which are drained by the streams which fall into the Amazon and Orinoco are appurtenances of Brazil and Venezuela respectively.

Surface, Rivers, &c.—The shores of this country are skirted by a mud bank, extending about seven or eight miles out to sea, rendering the approach from the sea exceedingly monotonous and difficult. Low land extends from the coast 40 to 70 miles inland, and is mostly on a level with the sea at high water. This land can with difficulty be protected from the sea, but when drained and cultivated, it yields rich crops.

The high land which lies at the back of this plain was till recently almost entirely unknown; but Mr. Schomburgk, under the auspices of the London Geographical Society, has made many valuable researches in British Guyana. The high land does not rise immediately from the plain to a great elevation, the hills on its southern edge attaining only a height of from 50 to 200 feet above the plain. Behind these hills the high land stretches out in level or undulating plains, rising here and there into eminences; but farther south ranges of hills appear running north-west and south-east parallel to the coast, or rather to the northern edge of the upper region, and south of them the surface is again depressed and extends in plains. The highest of the mountains reach an elevation of 4000 feet; but the highest continuous range does not exceed 1500 feet. In one spot, near 59° W. long., there is in the rainy season a water communication between the river systems of Guyana and Brazil. A considerable portion of this inland country consists of extensive savannahs covered with grasses and plants.

The largest river is the Essequibo, which traverses nearly the middle of British Guyana. At a point 230 miles from its mouth, the river is still some hundred yards wide, and forms a great cataract, called King William's Cataract. From this point it runs in a north-by-west direction, and receives, near 4° N. lat., the waters of the Rupunoony, a large river whose course has been investigated nearly to its source in the Carawaymee Mountains (2° N. lat.), and whose length is about 220 miles. After this junction the Essequibo continues in a north-western direction nearly up to 5° N. lat., receiving in this course a great tributary, the Siparoony, and forming a number of rapids and cataracts, which can only be passed by small vessels, and with danger. North of 5° its tortuous course is in general to the north; here too there are several dangerous rapids, and a great number of rocky islands in the river. Within the plain it receives from the west the waters of the united rivers Mazaroony and Cuyuni, which at the point of junction are more than a mile wide, and which unite 8 miles before they reach the Essequibo. The Cuyuni is navigable for 300 miles. In the wide æstuary of the Essequibo there are

numerous islands, some of which are extensive. Among them are Hog Island, Wakenaam, Leguan, and Tiger Island.

East of the Essequibo and parallel to it runs the Demerara, whose sources lie a little south of 5° N. lat. At 5° 25′ N. lat. it forms a great cataract, and below it becomes navigable for small craft. This river runs more than 200 miles, and, as it affords an easy means of transport for goods, there are many settlements on its banks.

Farther east runs the Berbice, whose source probably is situated near 3° 40′ N. lat. It has many rapids and cataracts, but is navigable for 165 miles.

The Courantin River forms the boundary between the Dutch and British possessions. At 200 miles from its mouth it is still 900 yards wide. Like most of the other rivers of Guyana, it has many rapids and cataracts, and its course is very tortuous. Near its mouth is an island, Parrot Island, 7 miles long. Seventy miles from the sea the tide rises 30 inches. At Oreála, 40 miles from its mouth in a direct line, it enters the low plain, and here it constantly preserves a width of a mile, which towards its mouth increases to 4 miles.

The river Surinam, which traverses the middle of the Dutch territories, rises somewhere about 4° N. lat. It enters the low plain at about 4° 40′ N. lat., and so far it is navigable for river barges. Towards its mouth it increases to a mile in width, and north of Paramaribo it is still wider. Vessels of considerable size can enter it and sail up to that town.

The Marony, which divides the Dutch and French Colonies, has many rapids and cataracts south of Armina, in 4° 45′ N. lat. From this place, to which the tide ascends, as far as its mouth, it is not less than 1½ mile wide, but full of islands. Large river vessels can ascend to Armina.

The Oyapock, which divides French Guyana from Brazil, is very little known to Europeans.

Climate and Productions.—Guyana has two rainy and two dry seasons. The long rainy season sets in about the middle of April, and lasts till August. The long dry season continues from August to November. February and March constitute the short dry season, but they are not quite so free from showers as the long dry season. The heat is not so great as might be supposed, considering the position of the country near the equator and the lowness of the coast: the trade-winds, and the land and sea breezes, tend to cool the air. The thermometer, even in summer, seldom rises above 90°, and it does not often descend below 75°. Though Europeans are subject to some diseases on their arrival, it is now well known that the climate of Guyana is more healthy than that of most places in the West Indies. Thunderstorms, hurricanes, and earthquakes, are rare.

Few countries on the surface of the globe can be compared with Guyana for luxuriance of vegetation, which shows itself especially in the great number of indigenous plants and the large forest-trees which cover perhaps not less than one-half of its surface. Timber, furniture-wood, and dye-wood are afforded in abundance. Indian corn, rice, mandioca, yams, sweet potatoes, arrow-root, bananas, pine-apples, cocoa-nuts, sugar, coffee, cotton, tobacco, ginger, pepper, clover, nutmegs—all are grown in Guyana. Wheat does not thrive well.

The domestic animals are the same as in England. Black cattle grow to a greater size than in Europe, but their flesh is not so tender nor of so fine a flavour. The wool of the sheep is converted into hair. Among the ferocious animals are the jaguar and couguar. Other animals are the armadillo, agouti, ant-bear, sloth, monkeys, lizards, iguana, alligators, bats, and snakes. The birds and insects are very numerous.

Inhabitants. — Guyana is inhabited by Europeans, Africans, and native Americans. The Europeans are mostly descendants of Dutch settlers, but some are descendants of Englishmen and Frenchmen. The Africans were brought over to cultivate the country as slaves, and are much more numerous than the whites. In British Guyana there are six tribes of natives, who are much more civilised than the aboriginal tribes who inhabit the adjacent countries. Some of them work for the English settlers.

Guyana is, as we observed, divided among Great Britain, Holland, and France.

I. *British Guyana* comprehends the countries extending from the Courantin River westward to the Orinoco, and from the sea-coast to the sources of the rivers Essequibo and Courantin. Its area probably does not fall short of 50,000 square miles. The settlements on the Pomaroon, the Essequibo, and the Courantin are few in number; but those along the banks of the Demerara and Berbice, as well as along the sea-shore between these rivers, are numerous, and extend from 30 to 50 miles inland. Previous to 1831 the country was divided into three colonies, Essequibo, Demerara, and Berbice, but in that year they were united under one government, called British Guyana. The residence of the governor is in Georgetown, formerly called Stabrock on the Demerara river, a short distance from its mouth. Its wide streets are traversed by canals. The houses are of wood, and seldom above two stories high. Before them are porticoes and balconies, shaded by a projecting roof, which is made of red wood, resembling mahogany.

Berbice was first settled by the Dutch in 1626, and remained mostly in the hands of Dutch Companies or traders till 1803, when it was finally ceded to Great Britain. The former capital of this province was Old Amsterdam, which was replaced by New Amsterdam, higher up the river Berbice, in 1796. It exends about a mile and a half along the river shore, and each house has an allotment of garden ground around it. The government house is a fine building.

British Guyana is under a governor-general and commander-in-chief, who includes in the same government the islands of St. Lucia and Trinidad. The actual administration of affairs is intrusted to a lieutenant-governor, who resides in Georgetown, assisted by a legislative council, including the chief justice, high sheriff, attorney-general, and ten other persons, and by several judicial courts.

The accounts of the colony are kept in dollars

and cents. The revenue in 1838 was 678,023 dollars: in 1846 it had reached 900,849 dollars. The chief sources of revenue are import duties, and wine and spirit duties. The expenditure in 1838 was 605,298 dollars: in 1846 it was 1,207,281. The colony expended for immigration purposes, in 1846, a sum of 371,884 dollars. The immigrants who landed there from other countries in 12 years (1835–1846) were 33,852; most of the coolies who entered Guyana in 1838 have returned to their own country. In 1846, 70 creole field labourers clubbed their savings together to buy an estate on the west bank of the Demerara River, for which they gave 25,000 dollars, an instance which Governor Light, in a despatch to Earl Grey, adduces to show the rising character of many of the working population. In 1838 there were 308 coffee and sugar estates in cultivation; in 1846 the number had fallen to 251, owing to the disasters attending the sugar trade. In 1846 there were 641 vessels entered the port of Demerara, with a tonnage of 107,820; those at the port of Berbice were 170, with a burthen of 2000 tons. The imports from the United Kingdom in 1844 were officially valued at 577,424*l.*; and the exports to the United Kingdom at 786,644*l.* The population in 1841 was, in Demerara and Essequibo, 77,928, of whom 18,583 resided in Georgetown; in Berbice 20,217, of whom 3460 resided in New Amsterdam; total, 98,145. At the time of the emancipation of the slaves, their number in this colony was 82,824.

II. *Dutch Guyana*, or *Surinam*, extends along the coast from the Courantin River to the Marony, and between them inland to their sources, which are probably in the Sierra Acaray. The area of this country may be not much less than 30,000 square miles. Along the coast and along the banks of the rivers are many settlements and plantations, especially on the Surinam and Saramecca rivers. The Jews are numerous in this country; and in the interior is a village, called Savanna, only inhabited by Jews, who cultivate their plantations. In the higher and hilly part are the Maroons, or runaway negroes, who have there formed a kind of political society. The capital, Paramaribo, about 10 miles from the sea, on the western bank of the river Surinam, is regularly built in the Dutch style, and has a population of 20,000 inhabitants. The streets are wide, and planted with orange-trees. The houses are generally two stories, and built of wood. There are some fine buildings in the town. Near it is the fortress Zelandia, in which the governor resides.

III. *French Guyana*, or *Cayenne*, extends along the coast from the river Marony to the Oyapock, which separates it from the empire of Brazil. Its area is stated to be 14,000 square miles. Nearly the whole tract, even along the sea-coast, is still covered with large forest-trees, and the settlements are neither so large nor so numerous as in British and Dutch Guyana. The French export sugar, coffee, cotton, cacao, and arnotto. The capital is Cayenne, situated on the northern side of an island formed by the river Cayenne. It is a poor place, with a population of about 2000, and its harbour is shallow.

History.—Guyana was discovered, before the end of the fifteenth century, by Vincent Pinzon. The Dutch formed the first settlement about 1590 on the Demerara River, and afterwards at other places. The English settled in 1634 in the neighbourhood of the Berbice and Surinam; but in 1667 the English settlements were given up to the Dutch. The French occupied Cayenne in 1633. During the last war with France the English occupied the Dutch settlements; and by the treaty of Paris, 1814, they restored only those between the Courantin and the Marony to the Dutch, retaining possession of the remainder.

(Bolingbroke's *Voyage to the Demerara, &c.*; Von Sacks's *Reisen nach Surinam;* Haefken's *Reize naar Guatemala;* Hillhouse and Schomburgk, in the *London Geographical Journal.*

GUYENNE, or GUIENNE, and GASCOGNE, two provinces in the south-west of France, formed together the largest of the 32 military governments into which that country was divided previous to the revolution of 1792.

Gascogne, which nearly coincides with the Aquitania of Julius Cæsar, and the Novempopulana of Augustus, takes its name from the Gascones or Vascones, a Spanish people, who wrested it from the Franks in the beginning of the 7th century. It included the countries west of the Garonne, and is distinguished by the names of Couserans, Comminges, Bigorre, Armagnac, Condomois, Marsan, Landes, and Labour, and now forms the departments of Landes, Gers, Hautes-Pyrénées, Haute-Garonne, and parts of Basses-Pyrénées, and Ariège, under which heads the particular features of the country are noticed. AUCH was its capital. From this province the Bay of Biscay is sometimes called the *Gulf of Gascogne.*

Guienne lay to the north of Gascogne, and extended from the Cévennes Mountains to the Bay of Biscay, including the districts of Rouergue, Quercy, Agenois, Périgord, Bazadois, and Bordelais. BORDEAUX was its capital. It now forms the departments of Gironde, Lot, Lot-et-Garonne, Dordogne, Aveyron, and part of Tarn-et-Garonne. The name is said to be a corruption of Aquitania, which designation was extended in the later divisions of Roman Gaul so as to include the districts northwards as far as the Loire. The entire government of Guienne and Gascony was sometimes spoken of under the name of Guienne.

The historical connection of Guienne and Gascony with the Plantagenet kings of England is noticed under AQUITANIA.

The Gascons, though a very simple, industrious, and sober people, are generally represented as boasting exaggerators. This notion is supposed to have originated from the circumstance, that in former times the younger sons of Gascon families were compelled, in consequence of their poverty, to seek their fortunes as adventurers in other countries, where, in order to gain attentions, which their circumstances generally failed to command, they were wont to speak in hyperbolical language of the great valour and wealth of their ancestors immediate and remote. Hence the term *gasconade* came to be equivalent to a harmless, amusing, and ofttimes highly comical vaunting.

GUYTON, DE MORVEAU, LOUIS BERNARD, was born in 1737 at Dijon, in the university of which his father was professor of civil law. In early life he showed a turn for mechanics, and after studying at home he went to college, which he quitted at 16 years of age; he then became a law student, and acquired much skill in that profession. Having been admitted honorary member of the Academy of Dijon, the lectures he heard there gave him a taste for chemistry; and in 1772, having previously published some less important papers, he gave to the world a collection of scientific essays, entitled 'Digressions Académiques.' The memoirs contained in this work on phlogistion, solution, and crystallisation merit particular notice, and evince the superior knowledge which he had acquired on the subjects that he had undertaken to illustrate. In 1773 he discovered the mode of destroying infection by the vapour of muriatic acid. In 1766 he commenced a course of well-attended lectures on chemistry at Dijon.

The fame of Morveau now began to extend to every part of Europe; and in 1767 he published the first volume of a course of chemistry, entitled 'Élémens de Chimie de l'Académie de Dijon.' The work was completed in four volumes, and was much admired. He afterwards supplied many articles to the 'Encyclopédie Méthodique.' He published a paper in the 'Journal de Physique' for 1782, to show the necessity of establishing a new and scientific chemical nomenclature.

On the breaking out of the French Revolution he became a decided friend to the popular cause, and was a member of the Convention and of the Council of Five Hundred. In 1799 Bonaparte appointed him one of the administrators-general of the mint, and in the year following director of the Polytechnic School; and after having been made one of the Legion of Honour he was created a baron of the French empire in 1811. At an advanced period of life he married, but left no children. After teaching about 16 years in the Polytechnic School he gave up the appointment; and after about three years' retirement he died on the 3rd of January, 1816.

The publications of Morveau on chemical subjects are very numerous, and few of his contemporaries contributed more to the advancement of the science.

GUZERAT, or GUJERAT. [HINDUSTAN.]

GY'AROS, one of the smaller Cyclades, situated nearly at an equal distance between Andros, Ceos, and Syros. It is about four miles long, and three miles in its greatest breadth, and is rocky and barren. It is now called Ghioura, and is not inhabited, except occasionally by fishermen. Under the Roman emperors it was used as a place of banishment.

GYGES. [LYDIA.]

GYMNADE'NIA, a genus of plants belonging to the natural order *Orchidaceæ* and the tribe *Ophrydineæ*. There are two British species, *G. conopsea* and *G. albida*. They are found in mountainous and hilly pastures, and blossom in June and July.

GYMNASTICS, or more properly *gymnastic*, (*γυμναστική*, from the word *γυμνός*, *naked*, it being customary among the Greeks to strip themselves, wholly or in part, before engaging in exercises). The first notice of their employment is found in the second book of the 'Iliad,' where the Grecian soldiers are described as having disembarked from the ships and playing at quoits and javelin-hurling on the beach; and again, in the twenty-third book, Achilles is represented as instituting games in honour of Patroclus, whose funeral ceremonies had just been performed, and as bestowing rewards on the victors in chariot-races, boxing, wrestling, quoit-throwing, &c. At this time they seem to have been principally practised as combining amusement with the best means of obtaining bodily strength and activity; but at a later period games were dedicated to the Gods, and, being regularly established, were conducted with the greatest ceremony. Honourable rewards and civil distinctions were publicly bestowed on the conquerors, the chief of whom were deemed in no slight degree exalted above their fellow-citizens. These rewards being called *athla* (*ἆθλα*) gave origin to the name of *athletæ* (*ἀθλητaί*), applied to those who contended for them; a designation adopted by the Romans, and from their language introduced into our own and others of modern Europe.

It was just before the time of Hippocrates, as Plato in the third book of his 'Politeia' tells us, that gymnastic was made a part of medicine, as a means of counteracting the bad effects of increasing luxury and indolence. It was gradually reduced into a complete system: public buildings called Gymnasia were erected for the purpose, and superintending officers appointed by the state.

The first gymnasia were built by the Lacedæmonians (Plato, *Νόμοι*, lib. i.), and after them by the Athenians, who had three in the immediate neighbourhood of their city; one, called Academia, where, attracted by the pleasant walks which surrounded it, and the concourse of people of all classes who daily resorted thither, Plato was in the habit of holding his conferences with his pupils; another, named Lyceum, in which Aristotle taught; and a third, called Cynosarges, which was frequented only by the lower orders. Those built by the Romans were on a more magnificent scale, and from the extensive baths which were attached to them are not unfrequently called Thermæ.

The exercises practised in the gymnasia were—dancing, wrestling, boxing, running, leaping, quoits, and hurling the javelin or some similar instrument.

The principle on which gymnastic exercises act is evident; their immediate effect is an increase both in the size and power of the parts exercised, in consequence of an admirable law which obtains in living bodies, that (within certain limits) in proportion to the exertion which it is required to make, a part increases not only in strength and fitness, but also in size. Instances of the application of this law may be seen daily. A person is called on to engage in some new avocation, in which muscular exertion is required, and every day he is not only improved in strength and dexterity, but the muscles brought into unusual action increase rapidly in size and vigour, so as

soon to surpass those of the rest of the body which have been less employed. Nor does the beneficial influence stop here. If the exertion be not carried so far as to produce excessive fatigue, all other parts of the body sympathise with the improving condition of that which is chiefly exerted; the circulation, being excited from time to time by the exercise, acquires new vigour, and, the blood being thrown with unusual force into all parts of the system, all the functions are carried on with increased activity. Improvement in the general health is soon manifested; and the mind (if at the same time judiciously cultivated) acquires strength, and is rendered more capable of prolonged exertion. As instances of the bad effects of a deficiency of exercise, it will be sufficient merely to allude to the condition of those who, being compelled to a sedentary occupation during the greater part of the day, neglect to occupy a part of their leisure time in some active exertion, as walking, riding, &c.

Excessive exercise, on the other hand, should be carefully avoided; for, though less frequent, instances are not uncommon where undue exertion has produced effects scarcely less injurious than those which result from inactivity. The existence of either class of evils is sufficient to prove that gymnastics should form a part of the education of youth, as much as 'literary instruction, music, and the art of design,' which with 'gymnastic' are mentioned by Aristotle ('Polit.,' lib. viii.) as the four branches of instruction recognised in his day. In order that gymnastics may produce their proper results, some general system should be established in all schools, by which one sex may be preserved from the evils of deficiency, and the other from those of excess in exertion; and the beneficial influences which gymnastics exercise on the mind as well as on the body may thus be secured to both.

(Plato, *Polit.*, lib. iii., *Laws*, lib. viii.; Galen, *De Tuendâ Valetudine;* Hieronymus Mercurialis, *De arte Gymnasticâ libri sex*, Venetiis, 1587.)

GYMNO'CLADUS, a genus of plants belonging to the natural order *Leguminosæ*. There is but one species, *G. Canadensis*, the Kentucky Coffee-Tree. The branches of this tree are without any appearance of buds, which, during the winter, gives it the aspect of a dead tree, and hence the Canadian name Stump-Tree. The wood is hard, compact, and of a fine rose colour. In America it is used in cabinet-making and carpentry. It has the property of rapidly converting its sap-wood into heart-wood, so that the smallest trees may be applied to useful purposes. This tree grows well in Great Britain, but does not ripen its seeds.

GYMNOPS, a genus of birds (*Goulins*) established by Cuvier, and described by him as having a bill as strong as that of the Orioles, the nostrils round, without scales or any membranous *entourage*, and a great part of the head denuded of feathers. He refers to *Gracula calva*, Gmel., *Mino Dumontii*, Less., and *Gracula cyanotis*, Lath. (*Merops cyanotis*, Sh.), as examples.

GYMNOSPERMS, one of the five divisions under which the vegetable kingdom is now classified. The name is derived from the seeds being naked, that is to say, unprotected by a pericarpial covering, and fertilised by the pollen coming in direct contact with the ovule, not by the intervention of the apparatus called stigma and style. In this respect Gymnosperms are analogous to those reptiles which, in the animal kingdom, have eggs that are impregnated by the male after they have been deposited by the mother.

The number of plants in which this peculiarity exists is inconsiderable; they entirely belong to the natural orders, *Coniferæ* in its most extensive sense, and *Cycadaceæ*. *Equisetaceæ* perhaps have to be added, but this is a point at present involved in doubt.

In their manner of growth Gymnosperms correspond on the one hand with Exogens, the wood of *Coniferæ* being arranged in concentric circles, and on the other with Endogens, the wood of *Cycadaceæ* being very nearly like that of a palm-tree. In fact, the class of Gymnosperms may be considered to unite the two classes of Exogens and Endogens so perfectly that not a link remains to be supplied. They also closely border upon Acrogens, of which *Cycadaceæ* have the gyrate vernation, *Coniferæ* the veining, and in some cases the peculiar arrangement of the male apparatus.

In addition to the differential characters of these plants, we have to add that their sexes are always separate, and that their leaves, if furnished with veins at all, have them parallel as in Endogens, or forked as in ferns, and never reticulated as in the class of Exogens.

GYMNO'TUS, a genus of fishes of the section *Apodes*. Generic characters: — Gills partially closed by a membrane, and opening before the pectorals; the vent placed very far forwards; body without any perceptible scales, and without dorsal fin; anal fin extending the greater part of the length of the body.

Gymnotus electricus (Linn.), from the resemblance it bears to an eel, and the electric power which it possesses, has been called the Electric Eel. It is about five or six feet in length; the head is rather broad and depressed; the muzzle is obtuse; the body, compared with that of the common eel, is stouter and shorter in proportion; the anterior part is nearly cylindrical, but towards and at the tail it is compressed; the pectoral fins are small and rounded; the anal fin commences at a short distance behind the line of the pectoral fins, and extends uninterruptedly to the tail; there is no caudal fin. Its colour is brownish black.

The Electric Eel is said to communicate shocks so violent that men and even horses are overpowered by them. This power is dependent on the will of the animal, but decreases in strength if frequently repeated, unless at considerable intervals. The organs by which this shock is produced are minutely described by Hunter in the 65th volume of the 'Philosophical Transactions.' All the species of Gymnotus inhabit the rivers of South America.

The genus *Cerapus* of Cuvier contains such species of Gymnotus of the older authors as have the tail lengthened and tapering, and the body compressed and furnished with scales. They also inhabit South America.

GYMNU'RA, a genus belonging to the order *Insectivora*, and established by Dr. Horsfield and Mr. Vigors for the reception of an animal brought from Sumatra, and first introduced to science by Sir Stamford Raffles, who described it under the title of *Viverra Gymnura*. Cuvier (vol. i. 'Add. et Corr.') observes that it appears to approach *Cladobates* (*Tapaia*, Raffl.) in its teeth, and the Shrews in its muzzle and scaly tail. The feet (plantigrade) are each furnished with five toes; the eyes are small; the whiskers long. The fur consists of a short dense woolly undercoat and of long coarse thinly set hairs.

Example, *Gymnura Rafflesii*.—This animal has the body, feet, stripe above the eyes, scattered occipital hairs, and the basal half of the tail black; the head, the neck, the scattered hairs of the back, and the other half of the tail, white. (Horsfield and Vigors.) Length of head and body (adult) 1 foot 2 inches, of the tail 10½ inches. Habits unknown; exhales a strong musky smell. Original specimens in the Museum of the Zoological Society.

(*Zool. Journ.*, vol. iii. 1827.)

GYNA'NDRIA, one of the classes in the artificial system of botany invented by Linnæus.

GYPA'ETOS, Storr's generic name for the Lämmergeyer, or Bearded Griffin (*Gypaëtos barbatus*), a bird of prey which may be considered as intermediate between the eagles and the vultures. [VULTURIDÆ.]

GYPOGE'RANUS, Illiger's generic name for the *Secretary Bird*, which some have placed with the gallinaceous tribe, others among the wading birds, and others again among the vultures. We agree with those who regard it as one of the aberrant forms of the *Falconidæ*, destined for terrestrial habits, and for feeding on reptiles and small quadrupeds. (Cuvier, *Règne Anim.*, vol. i. p. 338.)

Secretary Bird (*Gypogeranus Serpentarius*)

Generic Character.—Bill rather slender, shorter than the head, strong, very much hooked, curved nearly from its origin, and furnished with a cere at its base, rather vaulted, compressed at the point; nostrils placed at a small distance from the base, lateral, pierced in the cere, diagonal, oblong, open. Feet very long, slender, the tibia feathered behind, but not quite to what is called (improperly) the knee, whilst the feathers come a very little below the joint before; tarsus long, more slender below than in its upper part; toes short, warty below, the anterior toes united at the base by a membrane; hind toe articulated upon the tarsus. Wings long, armed with obtuse spurs; the five first quills the longest and nearly equal. Locality, Africa; the Philippines.

Mr. Ogilby, at a meeting of the Zoological Society of London (July, 1835), observed that a Secretary Bird (*Gypogeranus*) in Mr. Rendall's collection offered some peculiarities when compared with the common Cape bird, which at first induced Mr. Ogilby to believe that it might be a distinct species, and in this opinion he was in some degree confirmed by Mr. Gould; but he stated that a more attentive comparison of specimens from both localities (Mr. Rendall's having been sent from the Gambia) had considerably shaken his original opinion. Mr. Ogilby remarked however that still greater differences are indicated by Sonnerat in his figure and description of the Secretary of the Philippine Islands, and which, as far as the former was aware, had not been noticed by more recent naturalists. Whether or not the Secretaries of these three localities, the Cape of Good Hope, the Gambia, and the Philippines, may eventually turn out to be really distinct, or only varieties of the same species, must, he further remarked, be left for future observation; but, as it would be at least useful to direct the attention of travellers, collectors, and zoologists to the subject, he stated the principal marks which appeared to distinguish each, giving them provisionally specific names derived from the localities which they respectively inhabit, as follows:—

1. *Gypogeranus Capensis*, with the plume of long cervical feathers commencing upon the occiput, spreading irregularly over the upper part of the neck, narrow throughout the greater part of their length, as if the beard had been cut on each side close into the shaft of the quill, and spreading only at the point. Inhabits the Cape of Good Hope.

2. *Gyp. Gambiensis*, with the cervical crest commencing some distance below the occiput, arranged in two regular series, one on each side of the neck, with the intermediate space clear, and composed of long spatule-shaped feathers, much broader throughout than in the last species, though similarly decreasing in width towards the crest. In both these species the two middle feathers of the tail are considerably longer than the others. Inhabits Senegambia.

3. *Gyp. Philippensis*, with the cervical crest spread irregularly from the occiput to the bottom of the neck, the longest feathers being those situated the lowest, which is just the reverse of what is observed in *Gyp. Gambiensis*, and with

R.B.A.N.M.S.H.S.(M.) LIBRARY
Bloc-42
Accession No. 723
U.D.C No: 4-2-81
Date:

the two exterior tail-feathers the longest, so that the tail appears forked. This is apparent not only in Sonnerat's figure, but is expressly mentioned in his detailed description, and, if confirmed by future observation, is clearly indicative of a specific distinction. Inhabits the Philippine Islands. Described and figured in Sonnerat's 'Voyage à la Nouvelle Guinée,' p. 87, t. 50.

The colours of the three species or varieties here indicated do not, says Mr. Ogilby, in conclusion, seem to be materially different in other respects.

Sparrman, Le Vaillant, Smith, and others, have described at length the habits and manners of this singular and most useful bird, at considerable length; and to the works of these travellers we refer our readers. Their details relate to the Cape species (*G. Serpentarius* of authors, *G. Capensis*, Ogilby). It inhabits arid plains, and destroys great numbers of serpents, often not without a severe conflict. Querhoert, as quoted by Le Vaillant, says, 'In descending from a mountain into a very deep bog (fondrière), I perceived, nearly perpendicularly below me, a bird which raised and lowered itself very rapidly, with very extraordinary motions. Although I well knew the Secretary, and had killed many of these birds at Natal, it was impossible for me to recognise it in the vertical situation in which I found myself, and I only suspected that it was one from its bearing. Having found means, by favour of some rocks, to approach sufficiently near, noiselessly and without being discovered, I found that this bird was a Secretary combating a serpent. The fight was very sharp on both sides, and the skill (la ruse) equal on the part of each of the combatants. But the serpent, which perceived the inequality of its strength, employed that adroit cunning which is attributed to it, in order to save itself by flight and regain its hole; while the bird, divining its intention, stopped it at once, and, throwing itself before the serpent by one spring, cut off its retreat. Wherever the reptile essayed to escape, there it always found its enemy. Then, uniting skill with courage, it erected itself fiercely to intimidate the bird, and presented, with a frightful hiss, a menacing gape, inflamed eyes, and a head swollen with rage and poison.

'Sometimes this offensive resistance suspended hostilities for an instant; but the bird soon returned to the charge, and covering its body with one of its wings, as with a shield, struck its enemy with the other, with the bony protuberances of which I have already spoken, and which, like small clubs, overpowered it the more surely, inasmuch as it presented itself to the blows. In effect, I saw it reel and fall extended: then the conqueror threw himself upon it to finish his work, and with one blow of the bill split its skull.

'At this moment, having no further observations to make, I killed it. I found in its crop (for it has one, which nobody has stated), on dissecting it, eleven rather large lizards, three serpents as long as one's arm, eleven small tortoises very entire, many of which were about two inches in diameter, and, finally, a quantity of locusts (sauterelles) and insects, the greater part of which were sufficiently whole to deserve being collected and to be added to my specimens. The lizards, the serpents, and the tortoises had all received the stroke of the bill on the head.'

According to Lesson, attempts have been made to introduce the breed into the French sugar islands (Martinique, &c.), in the hope that it might diminish the race of the formidable *Trigonocephalus*, the Yellow Serpent of the Antilles (*Trigonocephalus lanceolatus*, Opp.), the most dangerous reptile of those parts, six or seven feet in length, and rivalling the rattlesnake in the intensity of its poison.

The Secretary Bird is about three feet in length; it lives in pairs and builds upon high trees, sometimes in dense thickets; it is very wary, and runs with considerable swiftness. Plumage, when perfect, for the most part blueish gray, with a reddish brown tinge on the wings; greater quills black. Throat and breast nearly white; rest of the under surface black, reddish, and white intermingled, the plumage of the legs bright black, with a slight intermixture of brownish rays. Occipital crest, which can be raised or depressed at pleasure, consisting of feathers without barbs at the base, but spreading out as they advance, and coloured of a mixed black and gray. Eyes surrounded by a naked skin, full, and overshadowed with hairs in the form of an eye-brow; eye-lashes long and strong.

For scientific opinions as to the affinities of the Secretary Bird, see Gmelin, Lacépède, Duméril, Illiger, Cuvier, Vieillot, Temminck, De Blainville, Latreille, Lesson, Vigors, &c.

GYPSUM, or sulphate of lime, is a mineral which is found in a compact and crystallised state, as alabaster [ALABASTER] and selenite, or in the form of a soft chalky stone, which in a very moderate heat gives out its water of crystallisation, and becomes a very fine white powder extensively used under the name of Plaster of Paris. [CALCIUM; MANURE.]

GYRACA'NTHUS, a genus of fossil placoid fishes, from the mountain limestone and coal strata: four British species. (Agassiz.)

GYRATION, CENTRE OF. When a system of heavy bodies, or any system possessing weight, has a fixed axis of revolution, the centre of gyration is a point at any such distance from the axis, that the moment of inertia would not be altered if the whole mass were collected at that point.

GYROCARPUS, a genus of plants containing few species, but these few are widely distributed in Asia and America. The Asiatic species grows to be a large tree, with cordate leaves, which are deciduous about the end of the rainy season; after which the flowers make their appearance in the cold weather, but are shortly followed by the new leaves. The wood of this tree is whitish-coloured and very light. It is preferred whenever procurable for making the catamarans, or rafts on which the natives come off to ships through the heavy surf of the Madras coast.

GY'RODUS, a genus of fossil ganoid fishes, from the oolitic and cretaceous strata chiefly: ten British species. (Agassiz.)

H is an aspirate of the guttural series, and is a faint pronunciation of the sound which in the High German alphabet is denoted by *ch*. In the earliest alphabets, as the Greek and Hebrew, the symbol whence the modern character is derived denoted the syllable *che* or *he*. Hence the Hebrew name was *cheth* or *heth*; and the Greek probably at first *heta*, as it was afterwards *eta*. As the guttural sound disappeared in the latter language, the letter finally denoted the simple vowel *ē*. In the Latin alphabet it was retained as the symbol of the aspirate. The English name *aitch* was probably at first *ech*, with the vowel prefixed, as in *ef, el*, &c. The guttural sound of *ch* is often confounded with the sibilant *ch*, as heard in *church*.

The letter *h* is liable to the following changes in different dialects :—

1. *H* is interchangeable with *c* [see C, 3]. To the examples there given may be added the Latin *decem* compared with the German *zehen*.

2. *H* is interchangeable with *ch*. Thus the Greek forms χειμων, χειμερινος, χαμαι, are severally connected with the Latin *hiems, hibernus, humi*.

3. *H* with *chth*. Of the interchange between the aspirates there are examples in the Greek χθες compared with the Latin root *hes* in *heri* and *hesternus*.

4. *H* is interchangeable with *g*. Examples: the German *zehe* compared with the Latin *digito*; the German *fliehen, sehen*, compared with the English substantives *flight, sight*.

5. *H* with *s*. Compare the Latin *sub, sex, septem, sus*, with the Greek ὑπο, ἑξ, ἑπτα, ὑς.

6. *H* with *f*. Hence the Latin words *hostis, hostia*, says Festus, were sometimes written *fostis, fostia*. The French word *hors* is derived from the Latin *foris*. The Spanish language abounds in examples of this change, as in *hermoso*, from the Latin *formoso*; the Portuguese retains the form *formoso*. [F.]

7. *H* with *w*. Many Greek words which had originally the digamma (another name for the letter *w*) at the beginning, took a mere aspirate afterwards. In English the word *who* has nearly exchanged the *w* for what is sounded as an *h*; and the relative adverb *how* is no doubt derived from the relative itself.

8. When any consonant or consonants in the middle of words had nearly lost all sound, the letter *h* appears to have been employed as a representative of the vanishing sound. Hence in Latin *mihi*, for what would appear by analogy to have been once *mibi*; and in German *stehen* and *gehen*, for what must have been *standen* and *gangen*.

9. The letter *h* is often dropped altogether in pronunciation, and hence in writing also. In Latin many words are written indifferently with or without an *h*, as *arena, harena*; *onustus, honustus*. The Italians for the most part are averse to all aspirates; but the people of Tuscany still maintain their ancient character for the strongest pronunciation of these harsh sounds.

HAARLEM, HAERLEM, or HARLEM, a city in the Dutch province of North Holland, stands on the Spaaren, which runs from the Lake of Haarlem into the Y, 4 miles from the shore of the North Sea, in 52° 23′ N. lat., 4° 38′ E. long., and has 24,000 inhabitants. It is connected by canals with all the principal towns in Holland, and by railway with Amsterdam and Leyden, from which it is respectively distant 12 and 13 miles. Haarlem is famous for its resistance to the Spaniards in 1572, and for the cruel treatment of its citizens by the son of the Duke of Alva after their surrender. The town is well built; the streets are clean, planted with trees, and traversed by numerous canals. It contains 9 Catholic churches, one of which, the cathedral of St.-Bavon, is the largest church in Holland, and celebrated for its great organ; there are besides 5 Calvinist churches and 1 Lutheran. The finest building in the town is the Stadhuis, or town-house, which stands on one side of the market-place. The Prinzenhof, in which the States-General of Holland formerly met, is now converted into a museum of arts, antiquities, medals, and pictures. The public walks on the site of the ancient ramparts are exceedingly agreeable. Haarlem, besides many other benevolent institutions, has an academy of sciences, a botanic garden, a public library, a national normal school for schoolmasters, and the Teyler institution, which comprehends an establishment for the poor, a society of natural history, valuable collections, and an observatory. The library boasts of the early productions of Laurence Coster, a native of this town, for whom the Dutch claim the invention of the art of printing. [Coster.] The neighbourhood of the town is studded with handsome country seats, and laid out in gardens. In the southern suburb of Haarlem are the famous nursery flower-gardens, which formerly supplied a great part of Europe with tulips, hyacinths, and other flowers. There are extensive bleaching establishments here, which formerly supplied large quantities of linen to England, whence the article came to get the name of *Holland*, as coming from that country. Silk, cotton, velvet, ribands, linen, and thread are among the principal manufactures.

The Lake of Haarlem, which lies S.E. of the town, is 14 miles long, 10 broad, and 14 feet deep, between water and mud. The mud of the lake is manufactured into valuable bricks called clinkers. The lake is now in course of being drained by steam-engines, in order to convert its area into arable land.

HAARLINGEN. [FRIESLAND.]

HABAKKUK, one of the twelve minor Hebrew prophets. We have no particulars respecting the place and time of his birth; but it appears probable that he prophesied in the beginning of the reign of Jehoiakim (B.C. 609). The prophecy of Habakkuk is written in an energetic style, and contains many beautiful passages. The third chapter is considered by Bishop Lowth as one of the finest specimens we possess of the Hebrew ode. The canonical authority of the book has never been disputed. It is quoted in the New Testament: compare Hab. ii. 4 with Rom. i. 17, Gal. iii. 11, and Hebr. x. 38; and Hab. i. 5 with Acts xiii. 40, 41.

HA'BEAS CORPUS is a writ at the common law, used for various purposes. It derives its name, like other writs, from the formal words contained in it. When the writ of Habeas Corpus is spoken of without further explanation, it always means the important writ which will presently be described; but it is also used for certain purposes in the courts of common law at Westminster, as for removing prisoners from one court into another, and for compelling the attendance of prisoners as witnesses, &c. But the great writ of Habeas Corpus is that which in cases of alleged illegal confinement is directed to the person who detains another; and the purport of the writ is a command to such person to produce the body of the prisoner, and to state the day and the cause of his caption and detention, and further to do, submit to, and receive (ad faciendum, subjiciendum, et recipiendum) whatsoever the judge or court that awards the writ shall direct.

All persons, whether natives or aliens, are entitled to this writ. The Statute 31 Chas. II. c. 2, which is called the Habeas Corpus Act, declares the cases and mode in which this writ may be obtained; and, lest this statute should be evaded by demanding unreasonable bail or sureties for the prisoner's appearance, it is declared by the 1 W. & M. Stat. ii. c. 2, that excessive bail shall not be required. The provisions of the 31 Chas. II. c. 2, are extended to Ireland by the Irish act, 21 & 22 Geo. III. c. 11.

It has been customary in times of alleged danger to suspend the Habeas Corpus Act. A suspension of the Habeas Corpus Act is effected by an act of parliament, which empowers the crown, for a limited period, to imprison suspected persons without stating any reason for the imprisonment. 'The effect of a suspension of the Habeas Corpus Act is not in itself to enable any one "to imprison suspected persons without giving any reason for so doing." But it prevents persons who are committed upon certain charges from being bailed, tried, or discharged, for the time of the suspension, except under the provisions of the suspending act, leaving, however, to the magistrate or person committing all the responsibility attending an illegal imprisonment. It is very common, therefore, to pass acts of indemnity subsequently, for the protection of those who either could not defend themselves without making improper disclosures of the information on which they acted, or who have done acts not strictly defensible at law, though justified by the necessity of the moment. See 57 Geo. III. c. 3 and c. 55, for instances of suspending acts; and 58 Geo. II. c. 6, for one of an indemnifying act.' (Coleridge's 'Note on Blackstone,' i. 136.)

The 56 Geo. III. c. 100, which was passed 'for more effectually securing the liberty of the subject,' after reciting that the existing acts only apply to cases of imprisonment on criminal charges, enacts that, if any person is imprisoned, except for crime or debt, any baron of the exchequer, as well as any judge of either bench in England or Ireland, shall, on complaint on behalf of the party confined, if reasonable cause appear to them, award in vacation time a Writ of Habeas Corpus, returnable immediately before the judge awarding the same, or any other judge of the same court.

The Statute 31 Chas. II. c. 2, introduced no new principle into the English law. From the date of the Great Charter at least, if a man was confined in prison on a criminal charge, he could apply to the Court of King's Bench for the writ of Habeas Corpus ad subjiciendum. This writ could not be refused. The object of the statute of Charles was to prevent the abuses which had grown up to the detriment of this important privilege.

Habeas Corpus is not a form known in the Law of Scotland. The form by which a person imprisoned gets his trial brought on, or his release if he is not brought to trial, is there called 'Running Letters.'

HABENA'RIA, a genus of plants belonging to the natural order *Orchideæ*. There are three species natives of Great Britain. *Habenaria viridis*, the Frog Orchis, is the *Peristylus* of Lindley, and the *Himantoglossum* of Reichenbach. It grows in pastures. *H. bifolia*, the Lesser Butterfly Orchis, has white flowers. It is found in heathy places. *H. chlorantha*, the Great Butterfly Orchis, grows in moist woods and thickets.

HABE'RE FA'CIAS POSSESSIO'NEM, a judicial writ directed to the sheriff, commanding him to put the recoverer of a chattel interest in lands into possession.

HABE'RE FA'CIAS SEISI'NAM, a judicial writ directed to the sheriff, commanding him to put the recoveror of a freehold interest in lands into possession. In the execution of this writ, as well as of the writ of *Habere facias Possessionem*, the sheriff may justify breaking open doors if the possession be not quietly delivered up.

HABINGTON, WILLIAM, the son of Thomas Habington, a Roman Catholic gentleman of family and fortune in Worcestershire. His mother, the daughter of Lord Morley, has been supposed to have been the writer of the famous letter which revealed the Gunpowder Plot. [FAWKES, GUIDO.] Habingdon was born upon the very day now marked as the date of the plot, the 5th of November, 1605. He was educated in the Jesuit college of St. Omer, and afterwards at Paris; and endeavours were used, but in vain, to induce him to enter the society. He married Lucy, daughter of William Herbert, the first Lord Powis. He died at Hindlip on the 13th of November, 1645, when

he had but just completed his 40th year. His published writings were the following :—1. 'Castara,' a collection of poems, first printed together in 1635. 2. 'The Queen of Arragon, a Tragi-Comedie,' printed in 1640. 3. 'The History of Edward IV.,' 1640, folio, said to have been partly written by his father. 4. 'Observations upon History,' 1641, 8vo.

HABSBURG, THE HOUSE OF, was the original title of the House of Austria. Rudolf, the founder of the Austrian dynasty, was born in 1218, and was the son of Albert, count of Habsburg in Aargau, and of Hedwige of Kyburg, who was descended through her mother from the once powerful House of Zäringen, and whose possessions he afterwards inherited. Having distinguished himself in the management of his own dominions, he was chosen, after the death of Conrad IV., emperor of Germany by the electoral diet at Frankfort in 1273. The dignity became in reality hereditary in his family, and was enjoyed by his descendants [GERMANY] till the death of Charles VI. in 1740. His daughter, Maria Theresa, having married Francis of Lorraine, Grand Duke of Tuscany, an attempt was made to dispossess her of the imperial crown, but it failed, and the succession has been ever since transmitted in the line of Habsburg-Lorraine.

The castle of Habsburg, the manorial residence of Rudolf I., has long since ceased to belong to his posterity. While Rudolf's successors were extending their sway over both hemispheres, they lost by degrees in the wars of Switzerland all their patrimonial domains in that country. Two square towers of the castle of Habsburg still remain, standing on a steep hill on the right bank of the Aar, not far from Brugg, and opposite the baths of Schinznach. The sepulchres of the Habsburg family, which were at Königsfelden, in the neighbourhood, have been removed to St. Stephen's cathedral at Vienna.

HABZE'LIA, a genus of plants belonging to the natural order *Anonaceæ*. *H. Æthiopica* is the *Piper Æthiopicum* of the shops. It is a native of Sierra Leone. *H. aromatica* is another species, yielding a pungent aromatic fruit. It grows in the forests of Guyana, and the fruit is used by the negroes as a condiment.

HACHETTE, JEAN NICOLAS PIERRE, was born at Mezières, May 6, 1769. He began his studies at Mezières, where Monge then held a professorship. At the age of 23 he was the successful competitor in the *concours* for a professorship of hydrography at Collioure. Some memoirs on mathematical subjects which he addressed to Monge, then minister of marine, procured him to be called to Paris, from whence he was sent to fill a professorship at Mezières, and at the end of 1794 was appointed to the Ecole Polytechnique, at its establishment. In this post he continued till the accession of Louis XVIII., by whose feeble and fanatical government he had, in 1816, the honour of being deprived of his professorship, at the same time when Monge was expelled from the Institute. The government above mentioned refused to sanction his admission to the Academy of Sciences; nor was it till after the Revolution of 1830 that the fellow-labourer of Monge, the Instructor of Poisson, Fresnel, Arago, and of more than two thousand of the best qualified public officers in France, was permitted to sit among his former pupils at the Palais de l'Institut. M. Hachette died in January 1834, at the time when the cholera was raging in Paris, though not of that disorder.

The greater part of the life of M. Hachette was devoted to the development of the descriptive geometry of Monge, and its application in the arts of life, particularly in the description and construction of machinery. Monge left the details of the descriptive geometry for the most part to Hachette, who made the first special applications, and particularly to the construction of machinery. His works on descriptive geometry (that of Monge being comparatively elementary) and on machinery are in high repute.

HACKERT, PHILIPP, a celebrated landscape painter, was born at Prenzlau, in Prussia, in 1737. His father was a portrait painter and a native of Berlin. Hackert's first works of importance were the six large pictures of the Russian naval victory of Tschesme, and the burning of the Turkish fleet by Count Orlow in 1770, painted for the Empress Catherine II. of Russia, and for which he was paid 2950 zechini, about 16,000 florins, or 1350*l.* sterling. Hackert was highly patronised in Rome both by Italians and foreigners. Pius VI. was delighted with his works. In 1786 the King of Naples appointed Hackert his principal painter. His salary was 100 ducats per month, with his apartments free, both in Naples and at Caserta. Hackert lived, after his departure from Naples in 1799, a short time in Leghorn, whence he removed to Florence, where he resided till his death in April 1807.

HACKET, JOHN, was born in the year 1592, and educated at Westminster School, whence he was elected to Trinity College, Cambridge, at the age of 16. In 1618 he took orders, and became chaplain to the Bishop of Lincoln. During the civil war he espoused the cause of Charles, and his house was a kind of rallying point for his party. His zeal however led him into difficulties, and he suffered a short imprisonment; but after the Restoration he accepted the bishopric of Lichfield and Coventry, where he died in 1670.

To Bishop Hacket we are chiefly indebted for the restoration of Lichfield Cathedral.

HACKNEY. [MIDDLESEX.]

HACKNEY-COACH. The derivation of the word Hackney, as applied to a class of public conveyances, is uncertain, and many curious conjectures on the subject are given in Todd's 'Johnson's Dictionary,' and in the lexicographical division of the 'Encyclopædia Metropolitana.' However this may be, it is sufficiently evident that the term *hackney* was first applied to horses let for hire, and then, by a very natural transition, extended to coaches, and subsequently to sedan-chairs, employed in a similar way.

By the 1 and 2 Wm. IV. c. 22, it is declared that every carriage with two or more wheels, used for plying for hire in any public street at any place within five miles from the General Post-

office in London, of whatever form or construction, or whatever may be the number of persons which it shall be calculated to convey, or the number of horses by which it shall be drawn, shall be deemed a *hackney-carriage*. This class of public vehicles appears to have originated in London. The rise and progress of their use in London may be pretty distinctly traced from notices in Macpherson's 'Annals of Commerce,' and in Anderson's 'History of Commerce,' of which work the early volumes of Macpherson are a reprint with but few alterations. Under the year 1625 Macpherson, or rather Anderson, observes that 'Our historiographers of the city of London relate that it was in this year that hackney-coaches first began to ply in London streets, or rather at the inns, to be called for as they were wanted; and they were at this time only twenty in number.' In 1652 the number of hackney-coaches daily plying in the streets was limited to 200; in 1654 it was increased to 300, allowing however only 600 horses; in 1661 to 400; and in 1694 to 700. By an act of the 9th year of Anne (c. 23) the number was to be increased to 800 on the expiration, in 1715, of the licences then in force, and 200 hackney-chairs were also licensed. The number of chairs was shortly increased to 300, and, by the Act 12 Geo. I. c. 12, to 400. In 1771 the number of coaches was further increased to 1000.

As early as 1813 a lighter kind of vehicle, drawn by one horse, was brought into use in Paris. With difficulty, in consequence of the opposition of the vested interests in hackney-coaches, in 1823 licences were obtained for eight cabriolets in London, which were started at fares one-third lower than those of hackney-coaches. The name 'cab' is now commonly applied to all hackney-carriages drawn by one horse, whether on two or four wheels. During the first few years of the employment of such carriages their number was restricted to sixty-five, while the number of coach-licences was increased to twelve hundred; but in 1832 all restriction as to the number of hackney-carriages was removed. The number of hackney-carriages licensed for use during the year ending January 4, 1845, was 2450, all of which, with the exception of less than 200, were cabs, or one-horse vehicles. The number of drivers licensed during the year ending May 1844 was 4627, besides 371 watermen.

The laws which relate to hackney-carriages and metropolitan stage-carriages are chiefly comprised in two acts of parliament: 1 & 2 Wm. IV. c. 22, which came into operation January 5th, 1832, entitled 'An Act to amend the Laws relating to Hackney-Carriages, and to Waggons, Carts, and Drays, and to place the Collection of the Duties on Hackney-Carriages and on Hawkers and Pedlars in England under the Commissioners of Stamps;' and 6 & 7 Vict. c. 86, entitled 'An Act for regulating Hackney and Stage Carriages in and near London.'

The limits of hackney-coaches and cabriolets are five miles from the General Post-office, London; and drivers of hackney-carriages are compellable to drive five miles from the place where hired or from the General Post-office; but, if any hackney-carriage shall be discharged at any place beyond the limits of the metropolis (that is, beyond a circle of which the radius is three miles from the General Post-office) after eight in the evening and before five in the morning, back-fare may be demanded to the nearest part of the said limits or to any standing-place beyond the limits where the carriage may have been hired, at the option of the hirer.

The fares of hackney-carriages are fixed by the Act 1 & 2 Wm. IV. c. 22. For every hackney-carriage drawn by two horses, for any distance not exceeding one mile, 1*s.*; for any distance exceeding one mile, at the rate of 6*d.* for every half-mile and for every fractional part of half a mile over and above any number of half-miles completed. By time, the fare is, for not exceeding thirty minutes, 1*s.*; not exceeding forty-five minutes, 1*s.* 6*d.*; not exceeding one hour, 2*s.*; and for any further time after the rate of 6*d.* for every fifteen minutes completed, and 6*d.* for any fractional part of fifteen minutes. The fares for hackney-carriages drawn by one horse (cabriolets) are one-third less, so that for the first mile they are 8*d.*, for a mile and a half, 1*s.*, and so on.

Every hackney-carriage and metropolitan stage-carriage has to take out a licence at the Excise-office, London, to which board the duty was transferred from the Stamp-office in 1847. The annual cost of a hackney-carriage licence is 5*l.*; of a stage-carriage, 3*l.* 3*s.*; and every driver of a hackney-coach, and every driver and conductor of a metropolitan stage-carriage, and every waterman at a stand, must also have a licence, for which 5*s.* is annually paid, and at the time of granting the licence a metal ticket is given, which every such driver, conductor, or waterman, is to wear on his breast in such manner that all the writing thereon may be distinctly visible. Plates are to be affixed to hackney-carriages with the name and abode of the proprietor and number of the licence.

Hackney-carriages standing in the street, though not on any stand, are to be deemed plying for hire. Drivers may ply on Sundays, and, if plying, are compellable to drive when hired. Agreement to pay more than legal fare not binding, but driver may agree to drive any distance at discretion for a stated sum, and must not charge more than that sum, though less than legal fare. Deposit to be paid for carriage kept waiting, and driver must take the deposit and wait.

The Act 6 & 7 Vict. c. 86, repeals a previous act (1 & 2 Vict. c. 79), and extends the enactments not specifically repealed of the 1 & 2 Wm. IV. c. 22, to the 6 & 7 Vict. c. 86. Other provisions of the acts relate chiefly to the restoration of property left in carriages, to furious driving, intoxication, insulting language, loitering, and other acts of misbehaviour; to proceedings of proprietors, drivers, and conductors, as to licences, payment of duties, contracts with each other; and to modes of granting summonses, powers of magistrates, punishments, penalties, &c.

HADDINGTON. [HADDINGTONSHIRE.]

HADDINGTONSHIRE is one of the three

counties of Scotland included under the general name of the Lothians, and is very commonly called East Lothian. It is bounded S.W. by Edinburghshire, S.E. by the Lammermuir Hills, and N. and E. by the Forth and the German Ocean. It is comprised between 55° 46′ and 56° 5′ N. lat., and 2° 20′ and 3° 2′ W. long. The extreme length of the county from east to west is about 27 miles, and its extreme width from north to south is somewhat less than 16 miles. The area is 224 square miles. The population, in 1841, 35,886.

Soil and Surface.—The surface of the county is extremely diversified, though not mountainous. The principal hills are those of the Lammermuir. The general inclination is from the foot of the Lammermuir range towards the N.E., but the descent is far from uniform. From the shore of the Frith of Forth the county consists of a series of parallel ridges running from W. to E., and successively increasing in altitude until they reach the Lammermuir Hills. The soil is very varied in quality in different parts; about four-fifths are under tillage, and the rest comprise woods, plantations, pastures, and wastes. The climate varies extremely for so small a county, and the period of harvest is a month later in some spots than in others.

The old red sandstone forms a considerable portion of this county, and generally rests upon transition rocks, and is covered by the coal formation. The Lammermuir range is composed chiefly of grauwacke, with a nearly vertical position of the strata. Small portions of other strata are met with in different parts of the county. The source of the Tyne is in Mid Lothian, a few miles west of Haddingtonshire; and its mouth is about three miles westward of Dunbar. The river abounds with large trout, eels, and small salmon. The other rivers, or 'waters,' as they are provincially termed, are—the Coalstone, Biel, Whitewater, and Fastna, to the south of the Tyne, and the Peffer to the north, by means of which, and their tributaries, nearly the whole county is well watered. The North British Railway passes through the county.

Manufactures and Produce.—Several attempts have been made to introduce manufactures into this county. Pot-barley mills, flax mills, cotton mills, paper mills, and starch works have been tried at different times, but from various causes they have failed; and the manufactures at present carried on in the county are very unimportant. A good deal of fishing is carried on near the coast. From Haddingtonshire the improved system of agriculture has been diffused over Scotland, and this county continues to hold a high rank in respect of agriculture and produce. The smaller farms are on the most productive soils. Wheat is the principal grain cultivated, though large crops of beans and oats are likewise raised. The turnip crops are very large. Barley is not much cultivated. Since the increase of pasture-land the breeding of sheep and cattle has been extended, but breeding in the lowland and midland districts is carried on upon a very limited scale, the more usual practice being to purchase and fatten for the Edinburgh market. In the Lammermuir district, however, the breeding of live stock is the chief business of the farmer. The manure of the farm-yard is that most generally resorted to throughout the county, but seaweed is employed along the coast, and lime in the upper districts. Rape cake and pulverised bones are also used. Great attention is now paid to the more complete drainage of the soil.

Divisions and Towns.—Haddingtonshire is divided into parishes. It returns two members, one for the county, and one for the Haddington parliamentary district. The principal towns are the following:—

North Berwick, a royal burgh, is situated on the coast, at the mouth of the Frith of Forth. The town is 22 miles N.E. from Edinburgh. It contained, in 1841, 607 inhabitants. The town consists of a long street running east and west, at the east end of which is the town-house, and a street leading to the harbour, which is inconvenient and difficult of access. It is contributory to the Haddington parliamentary district.

Dunbar, a royal burgh, situated 28 miles E. by N. from Edinburgh. The harbour, though difficult of access, is safe and commodious, and will admit vessels of 300 tons' burthen. Here once stood the castle to which Queen Mary fled in 1565, after the assassination of Rizzio. The town contained, in 1841, 3013 inhabitants. There are—a grammar school and a mathematical school, besides 2 parochial and 3 unendowed schools in the town, and a friendly society, called the Sailors' Society, in a very flourishing condition.

Haddington is the county town. It is 16 miles E. from Edinburgh. The town is paved, and lighted with gas, and consists principally of two streets running east and west, intersected by a third at right angles. The church is a venerable structure in the Gothic style, surmounted by a square tower 90 feet high. There are some other public buildings. The town carries on a considerable trade in wool, in tanning, and in preparing bones and rape-cake for manure. It is also one of the largest wheat-markets in Scotland. In 1841 the burgh contained 2786 inhabitants. Haddington, in conjunction with Dunbar, Jedburgh, Lauder, and North Berwick, returns one member to parliament.

Antiquities.—Circular mounds or encampments are occasionally met with in conspicuous situations. There are also numerous old castles, some of which are in a tolerable state of preservation. Of these it will be sufficient to mention the castles of Dunbar and Hailes, Tantallan, once the residence of the Douglases, which stands close to the sea, the castles of Dirlton, Luffness, &c.

HADDOCK. [MORRHUA.]

HADLEY, JOHN, the reputed inventor of the sextant which bears his name, became a Fellow of the Royal Society in 1717, and died February 15, 1744. He was author of several useful papers, which appear in the Transactions of the Society, from vol. 32 to vol. 39. He was also upon intimate terms with Sir Isaac Newton, from whom it is supposed he borrowed, without acknowledgment, the idea of the sextant. It is now generally be-

lieved that Newton and Godfrey were the original and independent inventors of that instrument. Hadley gave an account of the instrument in the 'Philosophical Transactions' for 1731; but Newton, previous to his death in 1727, had given a description of the instrument to Dr. Halley, by whom it was, for some unknown reason, suppressed, though it was communicated to the Royal Society in the year 1742, after Halley's death, by his executor, Mr. Jones. (Hutton's *Dictionary*, 1815; Herschel's *Astronomy*, p. 102; and *Trans. of the American Society*, vol. i. p. 21, Appendix.)

HADRAMAUT. [ARABIA.]

HADRIA'NUS, ÆLIUS, son of Ælius Hadrianus Afer (a cousin of Trajan, and a native of Hatria Picena, but of Spanish descent), and of Domitia Paulina of Cadiz, was born at Rome, in January, A.D. 76. He was left an orphan at ten years of age, under the guardianship of Trajan, and of Tatianus, a Roman knight. He made great progress in literature, especially in the study of Greek. In the reign of Domitian he served as commander of an auxiliary legion in Mæsia. Trajan gave him his niece Sabina in marriage, and he accompanied the emperor in his Dacian and Eastern campaigns. When Trajan died at Selinus, in Cilicia, in August 117, Hadrian, whom he had left in charge of the army in Syria, was proclaimed emperor by the soldiers at Antioch, and he wrote to the senate for their confirmation. His election being confirmed by the senate, Hadrian, after making peace with the Parthians and the Armenians, set off for Rome. He refused to appropriate to himself the triumph which had been destined for Trajan, and he caused the image of the deceased emperor to be carried in the triumph. He remitted all the arrears due to the public treasury by individuals in Rome and the rest of Italy, and all that was due from the provinces for sixteen years past; and he burnt in the Forum of Trajan the schedules of the debts, which are said to have amounted to several millions sterling. Medals were struck on this occasion with the figure of Hadrian holding a torch and setting fire to the heap. In A.D. 119 he repaired to Mæsia, and drove back across the Danube the Sarmatians and Roxolani, who had invaded the Roman territory. The year after, Hadrian began his travels through the various parts of the empire, which occupied, with few interruptions, the remainder of his reign. We have memorials of his travels in numerous medals, struck in the various provinces on the occasion of his visit. An Italian medalist, Mezzabarba Birago, has put these medals in order and illustrated them. Hadrian first visited Campania, whence he proceeded to Gaul, and the provinces called the Germanies. He affected no pomp or state in his travels. He lived like a soldier among the soldiers. But his liberality for all useful purposes was unbounded.

In A.D. 119 he crossed over to Britain, where he reformed many abuses. While in Britain, he constructed a rampart of earth, extending from the Solway Frith to the German Ocean near the mouth of the Tyne, a little to the south of the more substantial wall afterwards raised by Septimius Severus. On his return to Gaul he passed into Spain, and spent some time at Tarraco (Tarragona), where he held a general assembly of the deputies of the various provinces of Spain. Hadrian returned to Rome in A.D. 122; but the next year he was at Athens, a city to which he was much attached. He ordered the embankment of the Cephisus, which had damaged the town of Eleusis, and the construction and reparation of various edifices. From thence he went to Syria, where peace was confirmed between the Romans and the Parthians. In the year following he visited various parts of Asia Minor, and after building temples and other edifices at Nicomedia, Cyzicum, Nicæa, and other towns, he sailed to the islands of the Ægean Sea, and spent the winter at Athens, where he was initiated in the Eleusinian mysteries, and presided at the public games. He next went to Sicily, and ascended the summit of Ætna to see the sun rise. He returned to Rome in A.D. 126, and we know nothing of his movements for the two following years. In A.D. 129 he set off for Africa, where he distinguished himself, as he had done on his previous travels, by his munificence. Plautina, Trajan's widow, having died meantime, Hadrian returned to Rome, and celebrated her funeral with great ceremony. In the following year, 130, he raised a magnificent temple in honour of Venus and Rome, some remains of which are still seen near the arch of Titus. In that year Hadrian set off again for the East. He visited Cappadocia, Syria, Palestine, and Egypt, in which last country he remained two years.

There is a letter of Hadrian, written from Alexandria, to Servianus, his brother-in-law, in which he describes the state of the population of Egypt, and speaks of the various sects, Jews, Christians, Samaritans, who were very numerous in that country. He says that they all adored but one god, their own interest. He restored the palace and museum of Alexandria. About this time his favourite Antinous died; some say he drowned himself in the Nile, and Hadrian disgraced himself by the apotheosis and other absurd honours which he paid to his memory. He next went to Cyrenaica. In A.D. 133 Hadrian repaired to Syria, from whence he set off for Thrace and Macedonia, and lastly stopped at Athens. The insurrection of the Jews of Palestine under Barcochebas raged about this time, and the Romans had to carry on against the Jews a war for three years. [BARCOCHEBAS.] Hadrian raised a new city on the ruins of Jerusalem, which he called Ælia Capitolina, and he peopled it with a Roman colony. Jews and Christians were forbidden to enter the new city. Hadrian meantime made another long residence at Athens, and he greatly embellished that city, a district of which was called by the name of Hadrianopolis. He also completed the temple of Jupiter Olympius. He returned to Rome in A.D. 135. Soon after, falling ill, he thought of choosing a successor, and he fixed his choice upon Ceionius Commodus Verus, whom he adopted and appointed Cæsar by the name of Ælius Verus. In the following year Hadrian retired to the neighbourhood of Tibur, where he built a magnificent villa, many remains of which still exist. Protracted illness seems to have soured his naturally suspicious

temper, and he condemned several individuals to death, among others his brother-in-law Servianus. Ælius Verus having died in the second year after his appointment as Cæsar, Hadrian fixed his choice upon Titus Aurelius Antoninus, on condition that he should adopt Lucius Verus, son of Ælius Verus. Antoninus accepted the proposal, and the double adoption was solemnised in February 137. Sabina, Hadrian's wife, died about this time, and was numbered among the gods. Hadrian still finding his illness increasing, at last removed to Baiæ. He died in July, A.D. 138, in his 63rd year, and the 21st of his reign. (Spartianus, 'Life of Hadrian;' Dion; Aurelius Victor; Eusebius.) Hadrian was a man of great abilities and large acquirements, an encourager of sculpture and architecture, a good administrator, and very attentive to business. But he was not free from vices, if we may trust the evidence of the historians. It is said that he was the first emperor who allowed his beard to grow, in order to conceal some blemish on his face. Under Hadrian the distinguished jurist Salvius Julianus compiled the 'Edictum Perpetuum.'

The busts, statues, and medals of Hadrian are very numerous, and all bear a striking resemblance to each other in the character of the countenance. There is a full-length statue of him and two busts in the Townley Gallery, British Museum.

Coins of Hadrianus. British Museum. Actual Size. Copper.

Reverse.

HÆMATOCOCCUS, a genus of plants belonging to the natural order of *Algæ*. Several species of this genus have been described. One of the first observed was the *H. sanguineus*, which, like the Red-Snow Plant (*Protococcus nivalis*), has its cells coloured red; hence the generic name. Several of the species however are of a green colour. The species are found upon moist rocks, on the walls of caverns, and in damp places. Mr. Hassall has recently described several new species of this genus; they belong however to a class of plants in which it is most difficult to discover permanent specific characters.

HÆ'MATOPS, a name given by Mr. Gould to a genus of birds inhabiting Van Diemen's Land and New South Wales, and characterised by him in 'Zool. Proc.' for 1836 (Dec. 27).

Mr. Gould recorded two species, *Hæmatops valdirostris*, $6\frac{3}{4}$ inches in length (Van Diemen's Land), and *H. gularis*, 6 inches long (New South Wales).

These were among the specimens from which drawings had been taken for the first part of Mr. Gould's work on the Birds of Australia.

HÆMATO'XYLON CAMPECHIA'NUM (*Logwood*), a tree native of Campeachy, but cultivated also in Jamaica. The finest wood is the produce of the former place. The bark and alburnum being removed, there is within a dark red coarse-fibred duramen, having a violet-like odour, and a taste at first sweetish, afterwards astringent. It dyes the saliva violet-colour, and produces a similar change on many of the other secretions.

Logwood acts as a mild astringent in hæmorrhages or increased secretions; and in some forms of diarrhœa it often effects a cure where more powerful astringents fail. It may be exhibited in the form of infusion or of extract: the former is preferable. Logwood is also used extensively in the arts, especially for dyeing.

HÆMODORA'CEÆ. Under this name Dr. Robert Brown proposed, in the year 1810, to separate several genera from the natural order *Iridaceæ*. The order may be considered a connecting link between *Iridaceæ* and *Liliaceæ*. The rhizoma species, *Dilatris Heritieri*, yields a dyeing matter.

HÆMO'PTYSIS (from αἷμα, blood, and πτύω, to spit), a spitting or coughing of blood.

HÆMORRHAGE (from αἷμα, blood, and ῥήγνυμι, to break). The most common cause of hæmorrhage is external violence, by which the vessels of a part are divided, and the blood escapes from their cavities. When an artery is wounded, a bright scarlet stream of blood is emitted in a current, continuous, but increased in force at intervals corresponding with the pulsations of the heart. If a vein of some size be divided, a stream of dark crimson blood is projected in a perfectly continuous and equable current. In wounds in which no vessel of more than a line in diameter has been divided, the blood flows in a constant more or less rapid oozing.

When a large artery, as one of the main trunks of the limbs or head, is divided, the blood rushes forth with such impetuosity, that life is often destroyed almost instantaneously.

When an arterial branch of the second magnitude, as one of the primary divisions of the main trunks in the leg or fore-arm, is wounded, the flow of blood is at first profuse, and a large quantity is soon lost; but after a time the patient faints from extreme exhaustion, and then, the heart ceas-

ing to act, the blood no longer flows, but begins to coagulate both within and around the vessel, whose extremities contract, and further loss may thus be prevented. More frequently, however, as soon as the patient recovers from his exhaustion, and the heart regains some of its power, the slight obstacles formed during the fainting are forced away, and the hæmorrhage recommences, and continues till the patient is again exhausted. Thus, by a succession of hæmorrhages and of temporary stanchings, he may at last be destroyed by extreme debility. From arteries of smaller size, as those about the fingers, &c., the blood flows at first in a rapid little stream; but after a few minutes, if they are exposed to the cold air, they retract, their orifices contract and close, and the bleeding altogether ceases, without much danger of returning.

Hæmorrhage from wounded veins is of less importance. It is much more slow, for the blood is prevented by the valves from flowing from that part of the vein which is between the heart and the orifice, and in the part which is beyond the orifice it has only the force of that in the smaller arteries. Hence it is seldom immediately fatal; and when the patient becomes faint the edges of the vessel fall together, instead of remaining open, as those of arteries. Thus a coagulum forms within and round them, and, except from the largest trunks, prevents any further flow.

But bleeding to a great extent may take place without visible rupture of any vessel. This form of hæmorrhage, which may take place in various parts of the body, is that popularly supposed to arise from the 'bursting of a blood-vessel;' but in the large majority of cases, where blood is poured forth in the interior of the body, the most careful examination can discover no aperture through which it had flowed. It is therefore called hæmorrhage by exhalation, from the idea that the vessels, which in health are traversed only by the fluids of the exhalations or secretions, now permit the passage of the blood.

The circumstances under which these hæmorrhages take place are various. In some cases they arise from distension of the vessels in consequence of some local excitement, either with or without increased activity of the circulation generally; and in these the flow of blood is preceded by a sensation of fulness and throbbing in the part, which, if visible, appears red and swollen. Such are those which take place in bronchitis, producing some rare cases of hæmoptysis; in dysentery and acute inflammation of the intestines; from the membrane of the nose, producing the epistaxis so common in young persons in robust health; in the brain, producing some forms of apoplexy, especially those connected with hypertrophy of the heart; and occasionally in the acute inflammations of nearly all the tissues. In other cases the main cause of the hæmorrhage is the existence of some obstacle to the free passage of the blood through the vessels. Such are those very frequent cases in which hæmoptysis, or spitting of blood, takes place in consumption, where the blood is obstructed in its passage through the pulmonary arteries by the masses of tuberculous matter deposited around them; those of hæmatemesis, or vomiting of blood, which arise from obstruction of the splenic or portal vein, by coagula, or by disease of the liver or other adjacent organs, and the consequent congestion of the vessels of the stomach; many of those which occur from the stomach, uterus, and other organs, in the early stages of various structural diseases; those which depend on disease of the heart, producing obstruction in the large vessels, and which may take place in the brain, lungs, and various other organs; and those arising from obstacles in the veins, as in hanging, or even from the influence of gravitation.

But a simply mechanical distension of the vessels, whether from an increased afflux of blood into them, or a retarded removal of it from them, cannot explain all the phenomena of these spontaneous hæmorrhages. In some persons there exists a peculiar tendency to bleeding in the vessels, and this is called the hæmorrhagic diathesis. In other cases the blood appears to be in fault, as in scurvy, purpura, and the low forms of typhus.

Of the means of arresting Hæmorrhages. — When an artery is wounded, unless death rapidly follow, a natural process takes place by which further bleeding may be prevented. If completely divided, both extremities retract into the sheath of cellular tissue in which they lie, so that a considerable interval is produced between them, bounded by loose and irregular walls, into which the blood as it flows infiltrates, and, coagulating, tends to fill it up and obstruct the vessel. The open mouths of the artery also contract, and gradually but at last completely close, either at or just above their extremities. As the stream of blood is thus checked by the narrowing and closure of its canal, at the same time that by the faintness induced by the previous loss the action of the heart is weakened and the whole circulation retarded, it begins to coagulate within the vessel itself, till its tube is nearly filled by a clot adhering loosely to its walls. Further changes then ensue; the divided vessel and the parts around become inflamed; coagulating lymph is effused from the edges of the wound into the artery itself and over its extremities, forming a firmer plug than the blood alone had: in process of time this lymph becomes organised, vessels enter it from the parts around, and it becomes firmly and permanently united to them and the vessel, till at length its tube is rendered impervious from the point of division up to the first branch given off from it, and is at last converted into a solid cord, closely connected with the substance of the cicatrix around it.

But it is only in the very small arteries that the hæmorrhage can be confidently expected to terminate thus naturally, and hence various artificial means of checking bleeding from the larger ones have been invented. The simplest of these is pressure: if the finger be placed with moderate firmness over the mouth of a small bleeding vessel for a minute or two, on removing it the orifice will be found closed and no more blood will flow. Bandages and the tourniquet may be applied for the same purpose. But, if these means be insufficient, the artery must be tied; if it be completely divided, ligatures must be placed on both extre-

mities; and, if only partially cut, then on both sides of the opening, for, from the numerous communications of the arteries, when the main current is checked, another in a retrograde direction is always established into the part beyond the ligature. Sometimes astringent applications, as alum or sulphate of copper, will arrest slight bleeding. Spongy substances, as lint, agaric, &c., act mechanically in arresting hæmorrhage.

Such are the principal modes of treatment applicable in cases of external or surgical hæmorrhage, in which vessels are divided by external injury, and are within reach of the eye or fingers. In internal hæmorrhages, however, it is obvious that mechanical means can rarely be employed. From the varied nature of the cases from which they arise, it is evident that different means will be required, according to the several conditions of the system. If astringent remedies be deemed advisable, and in many cases they are highly useful, the acetate of lead will generally be preferable, and next to it the different vegetable compounds of gallic acid.

HÆMORRHOIDS (from *αἷμα*, blood, and *ῥέω*, to flow), varicose tumours of the veins of the rectum. [VEINS, DISEASES OF.]

HÆ'MULON, a genus of fishes of the section *Acanthopterygii* and family *Sciænidæ*. Generic characters:—a single dorsal fin; seven branchiostegous rays; lower jaw compressed, a small oval opening and two small pores under its symphysis; the vertical fins partially covered with scales.

These fishes generally approach to an elongate oval form; the body is moderately compressed; the tail is forked; the dorsal fin, which occupies the greater portion of the distance between the back of the head and the tail, although continuous, has a considerable indentation at that part where the spinous rays join the flexible. The portion of the under jaw which is covered by the upper when the mouth is closed is invariably of a bright red colour. The species of Hæmulon chiefly inhabit the Caribbean Sea, and are eaten by the inhabitants of the West Indian islands. They are of moderate size, varying from six inches to one foot in length, and generally adorned with longitudinal or oblique dark markings on a pale ground colour.

HÆMUS. [BALKAN.]

HÂFIZ, MOHAMMED SHEMS EDDIN, a celebrated Persian poet, was born at Shiras, at the beginning of the 14th century of the Christian æra. He appears to have remained in his native town the greater part of his life. The date of his death is uncertain; it is placed by Daulet Shâh in A.D. 1389. A splendid monument was erected over his grave, which is described by Kaempfer; and Franklin ('Observations on a Tour from Bengal to Persia,' pp. 90–97) gives us an account of another monument erected to his memory in more modern times.

The poems of Hâfiz, like those of Anacreon, celebrate the pleasures of love and wine. They have always been greatly admired in Persia, though many Mohammedans have condemned them for their irreligious and licentious tendency. The admirers of Hâfiz, on the other hand, contend that his poems are not to be understood in a literal, but in a figurative or allegorical sense; and that they express in emblematical language the love of the creature to the Creator. The sect of the Sûfis, who interpret the poems of Hâfiz in this manner, possess many similar poems.

The poems of Hâfiz were arranged, after his death, by Seid Kâsem Anvâri, and were entitled the 'Divân.' The 'Divân' contains, according to the best MSS., 571 odes, called ghazels. They were published in the original Persian, at Calcutta, 1 vol. fol., 1791; this edition contains only 557 ghazels, and 7 cassidehs, or elegies. The whole 'Divân' was translated into German by Von Hammer, Tübing., 1812; and several of the odes have been translated into English by Richardson, 'Specimen of Persian Poetry, or the odes of Hâfiz, with an English translation and paraphrase, chiefly from the 'Specimen Poeseos Asiaticæ' of Baron Rewuski,' Lond., 1774; Nott, 'Select Odes of Hâfiz translated into English verse,' 4to., Lond., 1787; Hindley, 'Persian Lyrics, or scattered poems from the Diwah-i-Hâfiz,' 4to., Lond., 1800.

HAGGAI, one of the twelve minor Hebrew prophets. We know nothing concerning the place or time of his birth. The date of his prophecy is fixed by himself (i. 1), in the second year of the reign of Darius, son of Hystaspes (B.C. 519). The canonical authority of this book has never been denied. It is quoted by the author of the Epistle to the Hebrews, xii. 26. Compare Hag. ii. 7, 8, 22.

HAGUE, THE (in Dutch, *'s Gravenhage*; in French, *La-Haye*), a large and beautiful city, the capital of the Dutch province of South Holland, stands in 52° 4′ 50″ N. lat., 4° 18′ 32″ E. long., at a distance of two miles from the North Sea, 37 S.W. from Amsterdam, and 13 N.W. from Rotterdam by the railroad which connects those cities. It is not fortified, but is surrounded with a moat crossed by drawbridges. It is ranked as one of the finest cities in Europe on account of its stately buildings, its broad and regular streets traversed by canals, and its pleasant, dry, and healthy situation. Many of the streets are planted with rows of trees and paved with coloured bricks. The finest parts of the town are the Voorhout, which is lined with trees, and contains several splendid hotels, and the Vyverberg, a sort of square, with a fine avenue of trees on one side, and on the other a spacious basin of water, backed by magnificent buildings. Among the public buildings are—the royal palace, a building of little pretension; the former residence of the Stadtholder, in which the States-General now hold their sittings; the palace of the Prince of Orange; the Buitenhof, which contains a gallery of pictures; the town-hall; the brass-cannon foundry; the theatres; and the state-prison. The Binnenhof, on one side of the Vyverberg, contains a magnificent Gothic hall, the only remaining portion of the original residence of the Counts of Holland. The Maurits-Huis contains the finest collection of paintings by Dutch masters in the world, a vast collection of Chinese and Japanese products and curiosities, besides numerous historical relics. The Royal Library in the Voorhout

contains 100,000 volumes, and a collection of 34,000 medals. De Witt's house in the Kneuterdyk, and the Gevangepoort (prison-gate), from which Cornelius and John De Witt were dragged by the populace and torn to pieces in 1752, are historically interesting. Among the churches are 3 Dutch Reformed, and one Roman Catholic. There are also 2 large synagogues, several Protestant chapels, numerous charitable and scientific institutions, and fine private collections of pictures. There is a royal country seat and numerous elegant villas in the environs.

The Hague owes its origin to a hunting-seat built by the counts of Holland in 1250, and the Dutch name, 's Gravenhage, is said to be taken from the circumstance that houses came to be erected along the inclosure surrounding the Counts' Park ('s Gravenhage, counts' hedge). In the 16th century the Hague became the residence of the States-General, the Stadtholder, and the foreign ambassadors. The Hague ranked only as a village till Louis Bonaparte, during his reign, conferred on it the privileges of a city. The population, which in 1837 was 54,000, is now stated at 61,000. The Hague is not a commercial nor a manufacturing town.

(Stein, *Handbuch;* Murray, *Hand-book for N. Germany.*)

HAGUE, LA, CAPE. [Manche.]

HAGUENEAU. [Rhin, Bas.]

HAHNEMANN, SAMUEL, founder of the system of medicine called Homœopathy, was born at Meissen, in Upper Saxony, on the 10th April, 1755. His father, Gottfried Hahnemann, who was an artist of considerable merit, was employed in the painting of china in the celebrated porcelain manufactory of Meissen. He was placed at an elementary school, the director of which, Dr. Müller, remarking talents that only required cultivation to raise the boy to eminence, persuaded his father to place him at the High School of Meissen, into which they obtained him a free admission. Hahnemann gladly availed himself of these increased facilities; he made himself master of Latin, Greek, and Hebrew, and evinced a decided bias for the study of the physical sciences, natural history, and medicine. Botany was also a favourite pursuit, and his hours of leisure were devoted to the collection of plants and their systematic arrangement.

Having chosen medicine for his profession, at the commencement of 1775 he left the High School of Meissen, and he entered the University of Leipzig.

He supported himself during his residence at Leipzig by giving lessons in German to foreign students, and by the translation of English and French medical authors. Having passed two years in the study of the theory of medicine, and saved a small sum of money, he departed for Vienna, there being no clinical lecturer in the University of Leipzig, and entered himself at the Hospital of Charitable Brothers, with a view to the completion of his studies and to acquiring a practical knowledge of his profession.

His moderate pecuniary resources were almost exhausted, when his talents and marked attention to his duties gained for him a firm friend in Dr. Quarin, physician to the Emperor of Austria, and chief physician to the Hospital, through whose recommendation, although he had not yet graduated, Hahnemann obtained the situation of family medical attendant and librarian to Baron von Brückenthal, Governor of Siebenbürgen, then residing at Hermannstadt. He remained here for two years, and being allowed to attend private practice he saved a small sum of money; with this he removed to Erlangen, where, on the 10th of August, 1779, he took his degree of M.D. In the year 1781 he was appointed district physician at Gomern, near Magdeburg, where he married.

In the year 1784 he removed to Dresden, where he gained a high reputation in the hospitals as a judicious and skilful practitioner; but, struck with the absence of a guiding principle in therapeutics, and the great uncertainty of the healing art, he gradually withdrew himself as much as possible from practice, and endeavoured to support his family by his old resource of translations of English and French medical authors, pursuing at the same time his favourite study of chemistry.

In the year 1790, while engaged upon the translation of the 'Materia Medica' of Cullen, he was struck with the different explanations given of the mode of operation of Peruvian Bark in intermittent fever: and, dissatisfied with them, he determined to try its effects upon himself. Finding that powerful doses of this substance produced symptoms strikingly analogous to those of that form of intermittent fever for which it was an acknowledged specific, he determined to try further experiments with other medicinal substances upon himself and upon some medical friends. He obtained similar results: that is, he produced by these agents factitious or medicinal disorders resembling the diseases of which they were esteemed curative; and thus the first dawn of the law of *Similia Similibus* gleamed upon him.

In 1801 he published a short treatise on the efficacy of Belladonna in the prevention and cure of scarlet fever, and affirmed that its curative properties were based upon the homœopathic law. In 1810 he brought out his great work the 'Organon of the Healing Art,' in which he developed his new system of treating disease, and for the first time gave it the name of 'Homœopathy,' by which it has since been distinguished.

In the year 1812 he returned to Leipzig, where he was appointed Magister Legens. At Leipzig he had an extensive practice, and was assisted by a great number of friends and pupils in the proving of his medicines. The apothecaries of that city, however, rose against him, and appealing to an old law long dormant, that forbade a physician to dispense his own prescriptions, they eventually, after some litigation, succeeded in 1820 in obtaining a decision in their favour. Hahnemann, unwilling to risk his own reputation and that of his system upon medicines prepared and dispensed by individuals avowedly hostile to his medical tenets, had determined to retire from practice, when the Duke of Anhalt Cöthen offered him an asylum in his dominions, with the enjoyment of those privileges of which he had been deprived at Leipzig.

Having been a widower for some years, he married in 1835 a French lady, who had visited Cöthen for the benefit of his advice, and with her removed to Paris. He remained there in the exercise of his profession, and surrounded by numerous followers of his system, of all nations, till the time of his decease, which took place on the 2nd July, 1843, in the eighty-ninth year of his age.

HAIL. [Snow.]

HAILES, LORD. [Dalrymple, Sir David.]

HAINAN, an island in the Chinese Sea, opposite the southern extremity of the province of Quan-tong, or Canton, from which it is divided by the Channel of the Junks, a strait only 15 or 16 miles wide. It lies between 18° 10′ and 20° 24′ N. lat., and 108° 50′ and 111° E. long., and incloses the Gulf of Tonquin on the east. Its length from south-west to north-east may be about 200 miles, and its average breadth perhaps not less than 100 miles; its surface may cover an area of 20,000 square miles.

The interior of the island is occupied by an extensive mountain-mass, called Ta Utshi Shan, or the Great Utshi range: from this there issue a great number of offsets, which are separated from the south-eastern and north-western shore by a level tract of considerable width. These plains, which are of great fertility and well cultivated, yield annually two or three crops of rice and other grains. Sweet potatoes form the principal food of the people, though they cultivate fruits, sugar-cane, tobacco, indigo, and cotton on a large scale. But the extensive forests which cover the sides of the mountains form the principal wealth of the island. The climate of the island is not very hot, being exposed to the wind which blows over a large expanse of sea. Fogs and heavy dews are frequent, and maintain a vigorous vegetation.

According to the census of 1823 Hainan was inhabited by 987,725 persons, subject to the Chinese government; but the higher parts of the mountains are possessed by aboriginal tribes, which are still independent, and called Li. Khiung-tsheou, the capital, situated at its northern extremity on the Channel of the Junks, is said to have 200,000 inhabitants; and Kai Kheou-so, where the governor resides, is said to contain as many.

HAINAULT (*Hene-gouwen*), a province of Belgium, bounded N. by East Flanders and South Brabant, E. by Namur, S. by France, and W. by West Flanders, lies between 49° 58′ and 50° 48′ N. lat., 3° 17′ and 4° 33′ E. long.; its greatest length is 63 miles, and its breadth 32 miles.

The most southern part of the province consists of a narrow strip 22 miles long, and 9 broad, which lies between the province of Namur and the French Ardennes. Its area is 1435 square miles, and the population, by the census of Oct. 15, 1846, was 715,796, which gives 498.8 to the square mile. The surface is for the most part level, but there are some hills towards the south and east. The soil, except in the arrondissement of Charleroi, in the south-east of the province, is very fertile. The chief crops are wheat, rye, oats, barley, beans, rape, flax, hops, and potatoes; tobacco and chicory are also grown. Much of the land near the rivers is laid out in meadow; in other parts trefoil, lucern, and sainfoin are cultivated. Horned cattle, horses and sheep of excellent breed are numerous; poultry, game, and bees abound. The *Schelde* enters the province from France, a little below its confluence with the Scarpe, and flows N.W. to Tournay; then changing its course to north, it forms the boundary line between Hainault and West Flanders, and quits the province at its north-western angle. The *Sambre* enters the province also from France, to the E. of Maubeuge, and flows N.E. past Charleroi to join the Meuse at Namur. The *Dender* rises within the province, flows eastwards to Ath, whence it turns almost due north, quitting Hainault at Grammont, and, having crossed a great part of East Flanders, enters the Schelde at Termonde. The *Haine*, from which the name of the province is taken, is formed by three brooks, which rise a little to the west of Charleroi; it flows W. past Mons, below which it is navigable by means of sluices, and joins the Schelde at Condé in France. The *Trouille* rises on the southern frontier, and flowing W. enters France, but leaves it again almost immediately, and falls into the Haine near Jemmapes.

The province is traversed by several good roads and numerous canals, by which communication was much facilitated, even before the making of railways; and, like every other part of Belgium, it is well supplied with this new and rapid means of transit. The great lines of railroad through Hainault are—the Brussels-Namur, and the Brussels-Valenciennes, which coincide as far as Braine-le-comte, where they branch off for Charleroi and Mons respectively. A short branch joins Tournay with the direct Lille-Antwerp-Ghent Line; another branch, the Jurbise-Ath, connects Ath with the Brussels-Valenciennes Line at Jurbise, the first station N. of Mons. The Sambre-Meuse Line, recently opened, will open up the great iron and coal districts in the S.E. of the province; it commences at Marchiennes, the first station W. of Charleroi, and terminates near the fortress of Givet, in the French department of Ardennes.

The commerce of the province is composed of its varied industrial products—glass, porcelain, pottery, salt, spirits distilled from grain, beer, machinery, woollen stuffs, linen, lace, Brussels carpets (the great manufacture of which is in Tournay), &c. The most considerable articles of export are coal, iron, and lime, which are transported by canals and railroads to France and the neighbouring countries. Slates, marble, and building stone are quarried.

The province is divided into 3 arrondissements, Mons, Tournay, and Charleroi, which are subdivided into 32 cantons and 424 communes. The principal towns are the following:—Ath. *Beaumont*, on the road from Mons to Chimay, stands on a hill commanding an extensive view over a very diversified country, the surface of which is broken by steep hills, and limestone and schistose rocks. It was formerly fortified, but its defences were demolished by the English in 1691; population 2000. *Binch*, W. of Charleroi on the right bank of the Haine, is a well-built walled town,

with 5000 inhabitants. In a fine square ornamented with a fountain stand a church, a college, and an hospital. The principal articles of manufacture are hosiery, leather, cutlery, glass, tiles, and pottery. *Braine-le-Comte,* at the junction of the Brussels-Namur and Brussels-Valenciennes railroads, has cotton-mills, breweries, dyehouses, tan-yards, oil-mills, and 4500 inhabitants. *Charleroi,* a strong fortress on the Sambre, 19 miles E. from Mons, stands on the Brussels-Namur Railway, and has 8000 inhabitants. It is also a manufacturing town; glass, salt, sugar, leather, nails, woollen yarn, &c., are among its products. The town stands in a most extensive coal-field, which gives employment to 10,000 men, and yields annually 3,000,000 tons of coal. The number of smelting furnaces, iron foundries, and nail factories in the surrounding district is very great. *Châtelet* is a small town, 4 miles E. from Charleroi, with 3000 inhabitants, who manufacture cotton, woollens, pottery, salt, beer, and leather. *Chievres,* a small town with 3055 inhabitants, near Ath, has important linen manufactures, breweries, and oil-mills. *Chimay* stands 24 miles S. from Charleroi, near the French frontier; it contains a college, and 4000 inhabitants, many of whom are engaged in the numerous iron works and coal-mines of the vicinity. There is a castle and park at Chimay, and several breweries. *Enghien,* 12 miles N.E. from Ath, contains 4000 inhabitants. The town is built on the side of a hill; it is regularly laid out, and well built; it contains a college and an hospital. The château of the Duc d'Aremberg, which was surrounded by a beautiful park, was destroyed at the first French revolution. The park still remains; it contains a temple, to which seven noble avenues of beech and chestnut converge. *Fontaine-l'Evêque,* 6 miles E. from Charleroi, contains 3000 inhabitants. It has several smelting furnaces, iron foundries, and nail factories. *Gosselies,* a town with 5000 inhabitants, stands 5 miles N. from Charleroi; nail-making, salt-refining, and glass-blowing are carried on. Many of the inhabitants are employed in the neighbouring coal-pits. Near Gosselies is *Gilly,* which has a population of 3200. *Lessines,* a town with 5000 inhabitants, north of Ath, is almost surrounded by the Dender. This is a place of much trade. The neighbouring quarries furnish large quantities of paving and building stone. There are salt-refineries, distilleries, and chicory-factories. The other chief branches of traffic are coal, wood, and oil. *Leuze,* 10 miles E. from Tournay, stands near the source of the Dender, and has 6000 inhabitants, many of whom are employed in manufactures. Mons. *Péruwelz,* 12 miles E. by S. from Tournay, on a feeder of the Schelde, is a town of 7000 inhabitants, who are principally occupied in manufacturing hosiery, cotton and woollen cloths, and leather. *Rœulx,* a small town containing 2450 inhabitants, is situated 8 miles N.E. from Mons. The castle of Rœulx, surrounded by gardens and grounds in the English style, is much admired. *St.-Ghislain,* 7 miles W. from Mons, in the middle of a great coal district, stands on the Haine, and has about 2000 inhabitants, who are engaged in bleaching linen, tanning, salt-refining, soap-boiling, and brewing. *Soignies,* a well-built town on the Senne, is 9 miles N. from Mons, on the Brussels-Valenciennes Railroad, and contains 7000 inhabitants. Many of the houses are large and handsome. The town is surrounded by old ramparts. The church of St.-Vincent is said to be the oldest building in the province. There is a college in the town, an orphan asylum, a convent of the Sisters of Mercy, and several other religious and charitable establishments. Beer, spirits, and leather are manufactured; and the large limestone quarries here are a source of considerable profit. *Thuin,* on the Sambre, 7 miles S. from Charleroi, stands partly on a steep rock, and contains 3800 inhabitants, many of whom are engaged in the iron mines and great iron works in the vicinity. Tournay. *Courcelles,* 5 miles N.W. from Charleroi, contains 3226 inhabitants, who manufacture nails and table-linen. *Dour,* 8 miles S.W. from Mons, has a population of 5484 inhabitants, many of whom find employment in the productive coal-mines of the district. *Fontenoy,* an inconsiderable village, 4 miles S.E. of Tournay, is historically famous for the great battle fought there May 11, 1745, between the French under Marshal Saxe, and the allied English, Austrians, and Dutch, commanded by the Duke of Cumberland, who was defeated with the loss of 15,000 men. *Hornu,* a village of 3500 inhabitants, 5 miles W. from Mons, is the seat of considerable coal-mines. The village is built on a regular plan, and inhabited almost entirely by the miners and iron-forgers of the neighbourhood. Steam-engines are manufactured here. *Jemmapes,* the first station S. of Mons, on the Brussels-Valenciennes Railway, has a population of 5000. It is celebrated for the victory gained on the 6th of November, 1792, over the Austrians, by the French under Dumouriez and the Duc de Chartres (the ex-King Louis-Philippe), and which led to the conquest of Belgium. *Jumetz,* 3 miles N. from Charleroi, contains 6728 inhabitants, who are engaged in the coal-mines and in manufacturing glass, beer, spirits, and leather.

HAINAULT, FRENCH, a district in the north-east of France, which formed with the Belgian province of Hainault the territory occupied by the ancient Nervii, whose capital was Bagacum, now Bavay. It was ceded by Spain to France by the treaties of the Pyrenees (Nov. 7, 1659) and Nimeguen (Sept. 17, 1678). Valenciennes, Maubeuge, Condé, Bouchain, Avesnes, Le-Quesnoy, and Landrecies were the principal towns of this district, which is now included in the department of Nord.

HAINES, River. [Zanguebar.]

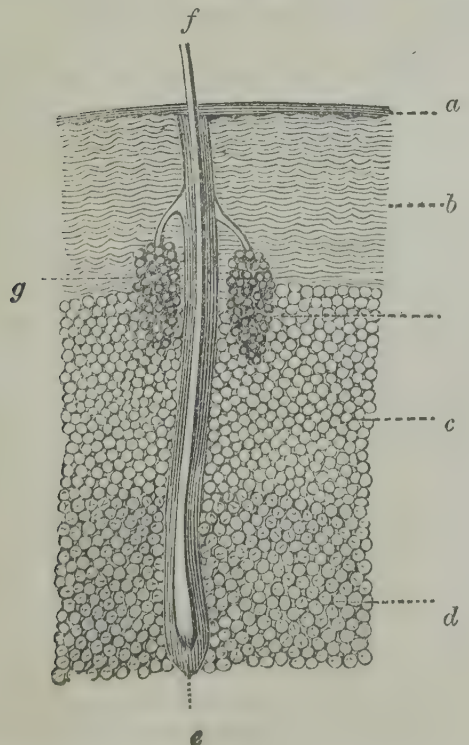
HAIR. The hairy coverings of mammalia are composed of long delicate processes of a horny substance, which grow from bulbs situated in or beneath the skin. Each hair is contained at its lower part in a delicate sheath, or follicle, which passes obliquely from the surface of the skin on which it opens to a greater or less depth, and at its base dilates into a pouch containing the bulb of the hair. The bulb of the hair consists of a small cone-shaped body, the pulp, soft and delicate, and apparently made up of blood-vessels and

nerves, and covered by a reflection of the smooth lining of the sheath of the hair, which is continued from the cuticle covering the surrounding skin. On the whole surface of this bulb the substance of the hair is secreted, and as each layer which is deposited pushes that previously formed onwards, the whole gradually advances along the sheath till it projects beyond the skin, and thence continues to grow free. Into each hair-follicle, as Gurlt has shown, there open the ducts of one or two little glands, by which the oily matter is secreted to lubricate the hair and keep it supple and firm, and where these are deficient the same purpose seems to be performed by the follicle itself. *Fig.* 1 represents an ob-

Fig. 1.

lique section of the pulp and lower part of the whisker of a lion, in the Hunterian Museum, in

Fig. 2.



which *a* is the body of the hair, *b* the conical pulp, and *c* a blood-vessel passing into and ramifying in it. *Fig.* 2 is a section of the skin, containing a hair from the human scalp, from the figure by Gurlt, in Müller's 'Archiv für 1835:' here *a* is the thin cuticle, *b* the cutis, *c* the subjacent fat, *d* the cellular tissue, in which the base of the hair follicle *e* is seen; *f* is the hair itself, enlarged at its base, and *g g* are the two sebaceous glands opening into the sheath.

In man the hairs are not, as has been generally supposed, perfectly cylindrical. Weber has shown that they are all more or less flattened, so that a transverse section presents an elliptical form, or sometimes, from one side being grooved, has the shape of a bean. The hair of the whiskers, beard, and mustachios, and in general all short curly hair, is most flattened. In most instances flatness and curliness are directly proportionate, and both attain their maximum in the crisp woolly hairs of the negro, which are sometimes as much as two-thirds broader in one direction than in the other. The hair of the negro however, though called woolly, differs considerably from the wool, properly so named, of sheep and other animals: the latter is not spirally curled, but wavy, all its curves being nearly in the same plane; it is much more delicate, and perfectly round, and hence, from its being equally fitted to curl in any direction, is peculiarly adapted for spinning, while the flattened hairs of men have always a tendency to turn their broadest surfaces towards the middle of the curl.

Except at their base, into which the conical pulp enters to a variable distance, the hairs are perfectly solid, and in most animals their substance is similar throughout. The average diameters of hairs from the human head are respectively about $\frac{1}{300}$th and $\frac{1}{500}$th of an inch, and hairs often attain a length of 6 or 7 feet in women. Instances are recorded also of the hair of the beard growing to a length of nine feet.

Hairs are very elastic; they admit of being stretched nearly one-third of their length, and regain their original length almost completely: in proportion to their size, they are very tough and firm. In masses they are impenetrable, except to very great violence, and hence one of their uses in the thick coverings of animals: they are also adopted in armour, as for the coverings of helmets. Hairs are bad conductors of both heat and electricity, and their oiliness prevents the influence of moisture on the animal body.

In chemical properties hair resembles horn, nails, &c. It is soluble in water at a very high temperature, as in a Papin's digester, leaving a large quantity of oil mixed with sulphuret of iron, and some sulphuretted hydrogen. It is this oil, with the sulphuret of iron, which gives the colour to the hair, and by whose absorption grayness is produced. The iron is most abundant in the darkest hair, and the sulphur is the ingredient on which the action of the various black dyes for red or gray hair depends.

HAIRS. In plants these are long expansions of the cuticle, chiefly intended to answer the double purpose of collecting moisture from the

atmosphere and of protecting the surface of a plant from the too powerful influence of the sun's rays. They also assist in the conveyance of certain kinds of seeds through the air, and in other cases, as in that of cotton, they are specially adapted for the use of man. That the two first purposes are those for which hairs growing on the surface of plants are intended, seems sufficiently indicated by the following facts. Hairs are seldom found on water plants, which have no occasion for absorbing organs, and when water-plants are accidentally obliged to grow in dry places they acquire them; while on the other hand species naturally found in hot dry places or in arid climates are as usually provided with them, unless in those cases where the cuticle becomes excessively thickened. If a hairy-leaved plant is observed in dry weather, it will be found that all its hairs are weak and flaccid; but no sooner does a shower of rain fall, or the atmosphere become humid, than the hairs acquire a rigid consistence.

In all cases hairs are composed of lengthened cells of cellular tissue, extending from one or more of the cells of the cuticle. Most commonly they are quite simple, and are merely formed of several cells of equally diminishing size, placed end to end, or of a single cell.

In consequence of the hairs of plants being an extension of cellular tissue, which is naturally thin-sided, all hairs are much weaker than the tough thick-sided tubes of which woody tissue is composed. This accounts for the well-known fact that all goods manufactured from cotton are far less tough and durable than those which, like linen, are prepared from the tissue of bark or wood. When the two forms of matter are submitted to microscopical examination, the thin sides and transverse partitions of the former will usually distinguish it from the thick-sided tubes of the latter, in which no partitions are discoverable.

HAJAR. [Arabia.]

HAKE. [Merlucius.]

HAKLUYT, RICHARD, born in 1553, studied at Christ Church, Oxford, and applied himself particularly to geography, or cosmography, as it was then called, and was made a lecturer on that subject at Oxford. About 1584 he went to Paris with Sir Edward Stafford, ambassador of Queen Elizabeth, where he remained five years. On his return to England, he was made by Sir Walter Raleigh a member of the company of gentlemen adventurers and merchants of London, for the inhabiting and planting 'of our people in Virginia,' as appears from his 'Collection of Travels,' edition of 1589, p. 815, which he published in one vol. fol., and which he afterwards enlarged and published in 3 vols. fol., 1599–1600, under the title, 'The Principal Navigations and Discoveries of the English Nation, by Sea or over Land, to the remote and farthest distant quarters of the earth, at any time within the compass of these 1500 years.' Hakluyt published also or edited translations of several foreign narratives of travellers, of which a selection has been since made: 'A Selection of curious, rare, and early voyages and histories of interesting discoveries, chiefly published by Hakluyt, or at his suggestion, but not included in his celebrated compilation,' 4to., London, 1812. Hakluyt died in 1616, and was buried in Westminster Abbey.

HAL, or HALLE. [Brabant, South.]

HALBERSTADT. [Magdeburg.]

HALCYONIDÆ. [Kingfishers.]

HALDE, DU, born at Paris in 1674, entered the society of the Jesuits, and was intrusted by his superiors with the care of collecting and arranging the letters written by the missionaries of the society from various parts of the world. This employment furnished him with materials for the collection styled 'Lettres Edifiantes et Curieuses.' He also compiled, from the reports of the Jesuit missionaries and their translations of Chinese works, a full and well-digested description of that empire, which was the first published in Europe: 'Description Historique, Géographique, et Physique, de l'Empire de la Chine et de la Tartarie Chinoise,' 4 vols. fol., with an atlas, Paris, 1735, reprinted soon after at the Hague, in 4 vols. 4to., and translated into English by R. Brookes, 4 vols. 8vo., London, 1736.

Du Halde was at one time secretary to Father le Tellier, confessor of Louis XIV. He died at Paris in 1743.

HALE, SIR MATTHEW, was born Nov. 1, 1609, at Alderley, in the county of Gloucester. Both his parents having died while he was an infant, Matthew Hale was educated, under the direction of a near relation on his mother's side, by a clergyman professing puritanical principles. At the age of seventeen he was removed to Magdalen Hall, Oxford, where he plunged into great dissipation. Accidental circumstances introduced him to Serjeant Glanvil, who, perceiving his good qualities, persuaded him to apply to the study of the law. He was admitted a student of Lincoln's Inn on the 8th of November, 1629, and immediately commenced a course of arduous study. One of his companions in a debauch having been taken dangerously ill, Hale was so struck with remorse that he gave up his intemperate habits. He was called to the bar some time previous to the commencement of the civil war. He resolved not to take any part in the political dissensions and contests which then agitated the country, and he steadily kept his resolution. His neutrality was favourable to his interest as an advocate; he was engaged as counsel for the court party in many of the most important state trials, and yet he was constituted counsel to the commissioners deputed by parliament to treat with the royal commissioners as to the reduction of Oxford. After the execution of Charles I. Hale took the engagement to be true and faithful to the Commonwealth, and accepted the appointment of one of the commissioners for reforming the law. In 1653 he was made one of the judges of the Common Bench. After having discharged the duties of his office with consummate skill and strict impartiality, he suddenly affected to feel scruples of conscience at acting as judge in criminal cases, and refused to preside in the crown courts, though he still continued to administer the law in civil

cases. On the death of Cromwell, Hale refused to act under a commission from the Protector Richard. He was a member of the parliament which recalled Charles II., and was made chief baron of the exchequer in 1660, and knighted. In 1671 he was raised to the chief-justiceship of the King's Bench, where he presided with honour to himself and advantage to the public till 1675, when, from the state of his health, he resigned his office. He died from dropsy on Christmas Day, 1676.

As a lawyer Hale's reputation is high, and his integrity is unimpeached. The only spot upon his memory as a judge is the fact of his having condemned two women for witchcraft, at the assizes at Bury St. Edmund's, in the year 1665. Hale in the course of the trial avowed himself a believer in witchcraft, and the jury found the prisoners guilty, notwithstanding many impartial bystanders declared that they disbelieved the charge. The prisoners were executed.

Sir Matthew Hale was a voluminous writer, though none of his productions were printed during his life. His 'Pleas of the Crown,' 'History of the Common Law,' and some other treatises connected with the law, have been published since his death, and also several others upon scientific and religious subjects. His valuable manuscripts he bequeathed to the Society of Lincoln's Inn, and he directed that they should not be lent out or printed.

A catalogue of the manuscripts was contained in his will, and a full account and catalogue of all his works is printed in Dr. Williams's 'Life of Hale.' His life has also been written by Burnet and Roscoe, and many anecdotes relating to him are detailed by that amusing gossip Roger North, in his 'Life of Lord-Keeper Guilford.' Notices of his life will also be found in the 4th vol. of the 'Biog. Brit.'

Sir Matthew Hale was twice married: first to Ann, daughter of Sir Henry Moore, by whom he had ten children; and secondly, late in life, to one of his own domestic servants.

HALEB (commonly but erroneously called ALEPPO), the capital of an eyalet of Asiatic Turkey of the same name, is situated in the north part of Syria, in 36° 11′ 32″ N. lat. (according to Niebuhr), and 37° 9′ E. long. Tavernier, in 1670, estimated the population at 258,000; D'Arvieux, in 1683, at about the same; Russell, in the last century, at 235,000, of which 200,000 were Mohammedans, 30,000 Christians, and 5,000 Jews; Volney reduces the number to 100,000; but Rousseau, who lived for some time at Haleb as French consul, estimated it at 200,000. Rousseau also informs us that the town is built on four hills, called Djeleb beni el-Kaka; that it is surrounded by a stone wall, and has seven gates. The condition of the city has been greatly changed by an earthquake which happened in August 1822, and which destroyed almost two-thirds of the buildings. The population is a mixture of Turks, Arabs, Christians, and Jews; of these the Greeks are the most numerous and the richest. The small river Koik runs along the west side of the town.

Before the earthquake of 1822 Haleb was supposed to possess 12,000 artisans, and was celebrated for its gold and silver lace, its manufactures of silk and cotton goods, shawls, &c. It carries on a great caravan trade with Persia, and the eastern parts of Asia. The goods destined for the European market are shipped from the port of Latakia. Consuls from all the commercial states of Europe reside at Haleb.

The ancient name of the town was Chaleb, or Chalybon, which was changed by Seleucus Nicátor into Berœa. It continued to be called by that name until its conquest by the Arabs under Abu Obeidah in 638, when its original name of Chaleb or Haleb was restored. It afterwards became the capital of an independent monarchy under the sultans of the race of Hamadan. In the latter part of the tenth century Haleb was again united to the Greek empire by the conquests of Zimisces, emperor of Constantinople. During the crusades Haleb was subject to the Seljuke princes. In 1260 it was plundered by the Moguls, and again in 1401 by Timur. It was afterwards annexed to the dominions of the Mameluk sultans of Egypt, but was conquered by Selim I., the Turkish sultan, and has since that time been subject to the sultans of Constantinople.

The inhabitants of the eyalet only cultivate the land in the mountainous districts, which produce wheat and other sorts of corn, melons, olives, cotton, tobacco, figs, &c.: the level parts of the country are abandoned to the Kurds and Arabs. The heat of the climate is seldom oppressive, in consequence of the west winds which blow from the Mediterranean. The country is reckoned healthy. The eyalet of Haleb is watered by the Euphrates, the Orontes, and the Koik. The Koik rises near Amtab in the north, and passing by Haleb loses itself in a morass about 16 miles south of the city.

HALES, STEPHEN, D.D., was born at Beckesbourn, in Kent, September 7, 1677, entered of Benet College, Cambridge, in 1696, was elected Fellow in 1702, and, having taken holy orders, was presented about 1710 to the perpetual curacy of Teddington, near Twickenham, where, though he obtained other church preferment, he resided to the end of his life. He was elected F.R.S. in 1717, and in 1753 was admitted a foreign associate of the Académie des Sciences, in place of Sir Hans Sloane. He died in 1761.

During his residence at Cambridge he applied himself diligently to the physical researches which continued to be his favourite pursuit through life. His first important publication was 'Vegetable Statics, or an Account of some Statical Experiments on the Sap in Vegetables,' &c.; and he made the first essays towards the modern discoveries in vegetable physiology. This work obtained for him a foreign reputation, being translated into French, Italian, Dutch, and German. 'Hæmostatics,' a similar treatise on the circulation of the blood, followed in 1733. Dr. Hales's genius was of a very practical turn: most of his numerous inventions and writings refer to some direct application of science to daily use, such as ventilation, the preservation of meat, the distillation of salt water, &c.

HALE'SIA, a genus of plants belonging to the natural order *Styraceæ*. The species are trees with drooping white flowers. *H. tetraptera*, common Snowdrop-Tree, is a tree growing from 15 to 20 feet high, and is a native of South Carolina. The wood is hard and veined. It is one of the hardest and also one of the handsomest of the American deciduous trees.

HALFORD, SIR HENRY, was born on the 2nd of October, 1766, and was the son of Dr. James Vaughan, physician to the Infirmary at Leicester. Sir Henry received his early education at Rugby, and was afterwards admitted at Christ Church, Oxford; he graduated in medicine at Oxford in 1794, and was elected a fellow of the College of Physicians in the same year. Having been well introduced into London society, and being distinguished for the elegance of his manners, and having early married a daughter of Lord St. John, it was not long before his practice became considerable. He was appointed by George III. one of his physicians, and in 1809 he became possessed of a large fortune by the death of his mother's cousin, Sir Charles Halford, and changed his name from Vaughan to Halford. He was made a baronet in the same year. Sir Henry continued to hold the office of physician to George III. till the king's death, and subsequently held the same appointment under George IV., William IV., and Queen Victoria. He was appointed president of the College of Physicians in 1824, and delivered the oration on the occasion of that body removing from their old building in the City to the new one in Pall Mall.

In 1813 Sir Henry Halford descended with the Prince Regent into the royal vaults of St. George's Chapel, Windsor, where, amongst other curiosities, they discovered the head of Charles I. Of this visit and discovery Sir Henry has given an account, which is deposited in the British Museum, and is authenticated by the signature of the Prince Regent. He died on the 9th of March, 1844. He had been for more than twenty years president of the College of Physicians, and was mainly instrumental in establishing the evening meetings of that body. His urbanity of manners and devotion to the interests of the college have left a grateful recollection amongst the members of that corporation. His publications consist of essays and orations.

HALICARNASSUS. [ANATOLIA.]

HALIFAX, a market-town and parish in the West Riding of the county of York, in the wapentake of Morley, was created a parliamentary borough by the Reform Act, and now sends two members to parliament. The borough includes the town and townships of Halifax, Owram, and Ovenden. The population of the town was, in 1841, 19,881. Halifax is 194 miles N.N.W. from London. There is a branch to Halifax from the Liverpool, Manchester, and Leeds Railway.

The chief articles at present manufactured at Halifax are worsted stuffs, including shalloons, tammies, calamancoes, duroys, everlastings, moreens, shags, serges, merinos; also baizes, narrow and broad cloths, and kerseymeres. Bombasins, crapes, and other fabrics, composed of silk and worsted, are also manufactured here, and the cotton trade is carried on to a considerable extent.

The appearance of the town of Halifax is generally handsome; it contains many edifices entirely of stone; it is well lighted with gas, and amply supplied with soft water from reservoirs about a mile north-west of the town, which were opened about 1827. The Hebble flows through the eastern parts of the town, and falls into the Calder. The Calder has been rendered navigable to its junction with the Aire and the Ouse. The scenery in the immediate vicinity of the town is of a highly interesting and beautiful character.

The parish church of Halifax is a handsome and spacious edifice of pointed Gothic architecture, erected at different dates. Trinity Church is a handsome Grecian building, with Ionic pilasters, and an elegant tower surmounted by a dome: it was built in 1795. St. James's Church, built in 1831, is in the pseudo-Gothic style, with turrets at the west end. The other places of public worship in Halifax are—a Roman Catholic chapel, built in 1836, three chapels belonging to the Independents, two belonging to the Baptists, two of the Wesleyan Methodists, two of the new Connection Methodists, one of the Primitive Methodists, a Friends' meeting-house, and a Unitarian chapel. A general cemetery was formed in 1837 by a company of shareholders. The free grammar-school at Skircoat was established in 1585 by letters-patent of Queen Elizabeth. Its property yields about 200*l.* a year, exclusive of the school-house, garden, and offices, which are occupied by the master. The school is free for classical instruction to all the sons of parishioners. The national school can accommodate 400 pupils; it generally contains about 200. The British school contains about 300 children of both sexes. There are also some smaller school charities. Waterhouse's Charity, established in 1636, provides almshouses for twelve poor widows, a stipend for the lecturer at the parish church, small yearly stipends to the curates of certain chapels of ease within the district, and various sums for other local purposes. The property of this trust has of late years greatly increased in value. The infirmary is a very noble building, which was commenced in 1836. It affords medical and surgical assistance both to in and out patients. A subscription of 5000*l.* was raised, to which an addition of 2500*l.* was made by the trustees of the dispensary, which institution is now consolidated with it. The literary institutions of Halifax are, the Literary and Philosophical Society, which has an elegant hall and a museum; the Mechanics' Institution, with a library of upwards of 1000 volumes; and the news-rooms, which also comprise a subscription library. There are also assembly-rooms and a theatre.

HALIFAX. [NOVA SCOTIA.]

HALIFAX, GEORGE MONTAGU, EARL OF, was the fourth son of George Montagu, Esq., of Horton in Northamptonshire, who was the fifth son of Henry, first Earl of Manchester. He was born at Horton, 16th April, 1661. His education was begun in the country, but he was eventually sent to Westminster School, where he was chosen

a king's scholar in 1677, and whence in 1682 he was removed to Trinity College, Cambridge. He produced, on the death of Charles II., in February 1685, some verses, which so charmed the Earl of Dorset that he induced the young poet to come up to town, where he was introduced by his lordship to all the wits of his acquaintance. In 1687 he and Prior brought out in conjunction their burlesque upon Dryden's 'Hind and Panther,' entitled 'The Hind and the Panther transversed to the Story of the Country Mouse and the City Mouse.' It is preserved in the 'Supplement to the Works of the Minor Poets' (1750), vol. i. pp. 47–82, under the head of 'Additions to the Works of the Earl of Halifax.'

Montagu appears to have some time before this entered upon his career as a politician. Johnson, in his 'Lives of the Poets,' says that 'he signed the invitation to the Prince of Orange, and sat in the convention.' In the convention parliament he sat for Malden; and he was returned for the same place to the next parliament, which met in March 1690. It is stated to have been about the time of the Revolution that he married the Countess Dowager of Manchester: she was Anne, widow of Robert, third Earl of Manchester, and daughter of Sir Christopher Yelverton, Bart.

According to Johnson, it was his intention when he formed this connection to take orders; but, afterwards altering his purpose, he purchased for 1500*l.* the place of one of the clerks of the council. He was also fortunate in his next poetical performance, 'An Epistle to Charles, Earl of Dorset, occasioned by His Majesty's Victory in Ireland,' being a celebration of the battle of the Boyne; for which King William, to whom he was introduced upon the occasion by Dorset, is said to have bestowed upon him a pension of 500*l.*

The rest of his history is that of a political character, and a patron of poets. He raised himself by his speaking to great distinction; and on the 21st of March, 1691, he was taken into office as one of the Lords of the Treasury. He was appointed Chancellor of the Exchequer on the 1st of November, 1695, and to which on the 1st of May, 1697, he conjoined that of First Lord of the Treasury. In 1695 and 1696 he obtained great credit by his management of the operation of the general recoinage of the silver money. It was in the latter of these years that, to supply a temporary circulating medium, he contrived what are called Exchequer Bills, the convenience of which species of paper, both for the government and the public, has kept it in use ever since. On the modification of the ministry in November 1699, Montagu was removed to the auditorship of the Exchequer. In the end of the following year, he was created Baron Halifax (with remainder, failing his own issue male, to George Montagu, son and heir of his eldest brother Edward Montagu).

Lord Halifax was impeached by the new House of Commons, in April 1701, for several alleged acts of misconduct in office, along with Lord Somers and the Earls of Portland and Oxford. The question was carried in the House by a vote of 186 against 163; but the impeachment was not prosecuted, and on the 24th of June the charges were dismissed by the Lords.

In 1703, after the accession of Queen Anne, Halifax was again attacked by the Commons on the charge of having been guilty of breach of trust in the management of the public accounts while he was Chancellor of the Exchequer; but he was again protected by the Lords. Halifax first moved for the establishment of a public library, out of which eventually came the British Museum.

Having always kept up a connection with the Hanoverian family, Lord Halifax was found, on the death of Queen Anne, to be one of the nineteen persons appointed by the new king to hold the government along with the seven great officers of state till his majesty should come over. On the 14th of October, 1714, he was raised to the dignities of Earl of Halifax and Viscount Sunbury, and was restored at the same time to his former post of First Lord of the Treasury, his office of auditor of the Exchequer being given to his nephew. But he died of an inflammation of the lungs on the 19th of May, 1715.

HALIO'TIDÆ, *Haliotis Tribe* or *Family* (*Les Ormiers* of the French; Ear-Shells, or Sea-Ears). Of this group of Gastropods, Linnæus records only seven species, and Mr. Dellwyn seventeen. They are now known to be very numerous, as is attested by Mr. Swainson in the first series of the 'Zoological Illustrations.'

Cuvier, in the last edition of his 'Règne Animal' (1830), makes the *Ormiers* (*Haliotis* of Linnæus) the first genus of his eighth order of Gastropods, *Scutibranchiata*. He observes that it is the only genus of the order which has its shell turbinated, and that among this sort of shells that of the *Ormiers* is remarkable for the amplitude of its aperture, its flatness, and the smallness of the spire, which is seen from within. This form, he adds, has caused it to be compared to the ear of a quadruped. Cuvier divides the genus into the following subgenera:—1. The *Haliotids*, properly so called (*Haliotis* of Lamarck). 2. The *Padolli* of De Montfort. 3. The *Stomatiæ* of Lamarck. The *Ormiers* are immediately followed by genera dismembered from the *Patellæ*, namely, *Fissurella*, *Emarginula*, and *Paramorphus*. M. De Blainville's arrangement is very similar to that of Cuvier. ('Manuel de Malacologie,' 1825.)

Genus *Haliotis*.—In the genus *Haliotis* the shell is wonderfully brilliant, with iridescent hues, reflected from its nacreous surface. Mingled tints of purple, red, blue, and green, interchanging in various lights, produce an admirable effect. The general form of the shell is oval, more or less depressed, with a small spire having a lateral aspect posteriorly; the aperture is as large as the shell, with a continuous border; the right border is delicate; the left or columellar border is flattened, enlarged, and trenchant; along this border is a series of orifices, in lineal order, as if drilled in the shell. Muscular impression oval, and in the centre of the under side.

Animal.—One of the most ornamented of Gastropods. All round its foot to its mouth there is,

at least in the more common species, a double membrane cut out into leaflets (feuillages) and furnished with a double row of filaments. On the outside of its long tentacles are two cylindrical pedicles for carrying the eyes. The mantle is deeply divided on the right side, and the water, which passes by means of the holes in the shell, can, through this slit, penetrate into the branchial cavity; along its edges again are also three or four filaments, which the animal can also cause to come out through these holes. The mouth is a short proboscis. (Cuvier's description for all Gmelin's *Haliotides*, except *H. imperforata* and *perversa*.)

The *Haliotides* are marine and littoral in their habits. Covered with their buckler-like shield, and destitute of an operculum, they adhere by their foot to the surface of the rocks, where they creep about, feeding on herbage, which, according to Lamarck, they seek for, during fine summer nights, along the margin of the shore.

Excepting in the colder latitudes, the genus *Haliotis* is distributed through all seas; the largest however are natives of the hotter regions. Of these some are nearly as large as a plate, and are absolutely dazzling from the splendid iridescence of their nacre. One species, the *Haliotis tuberculata*, is common on the coasts of southern Europe, and is found in tolerable abundance on the coasts of Guernsey and Jersey, where it is used as food. Empty shells are occasionally washed up on the southern shores of our island.

Genus *Padollus*, Montfort.—This genus, says Cuvier, has the shell nearly circular, almost all the holes obliterated, and a profound furrow which follows the middle of the whorls, and is marked externally by a salient crest. This genus, though admitted by Dr. Leach, is rejected by G. B. Sowerby.

Genus *Stomatia*, Lamarck.—In this genus the shell is more hollow and with a more salient spire than in *Haliotis;* it is, moreover, destitute of perforations: in other respects it resembles that of *Haliotis*, being a link between it and certain groups of *Turbo*. The animal is far less ornamented than is that of *Haliotis*. Example, *Haliotis imperforata*.

Fossil Haliotidæ.—Mr. G. B. Sowerby, speaking of the true *Haliotides*, says that the existence of fossil species is very doubtful.

HALISPO'NGIA. According to the structure and composition of the numerous species of sponges, they may be divided into genera. If, in accordance with the observations of Dr. R. Grant, we consider sponges in three groups, one having a horny tubular structure, another containing calcareous spiculæ, a third containing silicious spiculæ, we may adopt the three generic types, *Spongia*, *Calcispongia*, and *Halispongia* of De Blainville.

Halispongia is thus characterised:—Mass more or less rigid or friable, of irregular figure, porous, traversed by winding canals, which end in openings scattered over the surface; substance subcartilaginous, supported by simple silicious spiculæ.

The species exhibit various external forms, incrusting, branching, or foliaceous. Dr. Fleming includes them under the title *Halichondria*.

HALL. [Jaxt.]

HALL, or HALLE, EDWARD, an English lawyer and historian, was the son of John Halle, of Northall in Shropshire, and was descended from Sir Francis Van Halle, K.G., in the time of Edward III., who was the son of Frederic de Halle of the Tyrol, natural son of Albert king of the Romans and archduke of Austria. He was born, at the close of the fifteenth century, in the parish of St. Mildred, London, and received the first part of his education at Eton School. In 1514 he became scholar of King's College, Cambridge, and continued there till he became a junior fellow; afterwards, about 1518, when Cardinal Wolsey founded various lectures at Oxford, he removed to that university. He was called to the bar, and became under-sheriff of the city of London. In 1533 he was appointed summer-reader of Gray's Inn, and in 1540 double reader in Lent, and one of the judges of the Sheriff's Court. He died in 1547, and was buried in the church of St. Benet Sherehog, London.

Hall's Chronicle, entitled 'The Union of the two noble and illustrate Families of Lancaster and Yorke,' was first printed by Berthelette, in small folio, in 1542.

HALL, JOSEPH, an eminent divine and prelate, was born July 1st, 1574, at Ashby-de-la-Zouch, in Leicestershire, and received his academical education at Emmanuel College, Cambridge, of which he was elected fellow. He was made dean of Worcester in 1617; sent as one of the English deputies to the synod of Dort in 1618, appointed bishop of Exeter in 1627, and translated to Norwich in 1641. In November 1641, having joined others of the bishops in a protest against all laws made during their forced absence from parliament, he was sent to the Tower, and only released on giving bail for 5000*l*. In the next year the revenues of his bishopric were sequestrated, and during the rest of his life he suffered much from poverty and harsh treatment, of which he has given an account in a piece called 'Hard Measure.' He removed in 1647 to Higham, near Norwich, and died there in 1656.

His numerous works fill several volumes in the old folio editions, and ten in the modern 8vo. They are chiefly controversial. His 'Contemplations' are of more personal and lasting interest, as also his 'Enochismus, or Treatise on the Mode of Walking with God,' a beautiful tract, translated into English in 1769. To the student of English manners his Satires entitled 'Virgidemiarum,' in six books, are peculiarly valuable.

HALL, ROBERT, was born May 2, 1764, at Arnsby in Leicestershire, where his father had been settled since 1753 as pastor of a congregation of Particular Baptists.

He lost his mother in 1776, and it appears to have been after this that he was sent to board at a Baptist school in Northampton, kept by the Rev. Dr. John Ryland. Here he remained for a year and a half, after which he was placed at the Bristol Academy, with the view to his becoming a Baptist clergyman. Hall was, as it is expressed, set apart as a preacher by his father's congregation in August 1780. In the autumn of 1781

he was selected by the authorities of the Bristol Academy to be sent to King's College, Aberdeen, which place he did not finally leave till May 1785; but he had already, during the preceding summer, officiated as one of the regular pastors of the Baptist congregation at Broadmead, Bristol, in association with Dr. Caleb Evans; and in August 1785 he was also appointed classical tutor in the Bristol Academy. His father died in 1791, and the same year a difference with Dr. Evans led to his removing from Bristol, and accepting an invitation to become pastor of the Baptist congregation at Cambridge.

He had already acquired considerable celebrity as a preacher, but it was not till now that he appeared as an author. His first publication (unless we are to reckon some anonymous contributions to a Bristol newspaper in 1786–7) was a pamphlet entitled 'Christianity consistent with a Love of Freedom, being an Answer to a Sermon by the Rev. John Clayton,' 8vo., 1791. In 1793 he published another liberal pamphlet, entitled 'An Apology for the Freedom of the Press, and for general Liberty, with Remarks on Bishop Horsley's Sermon preached 31st January, 1793.' The impression that had been made upon him, however, by the irreligious character of the French revolutionary movement was indicated in his next publication, 'Modern Infidelity considered with respect to its Influence on Society, a Sermon,' 8vo., 1800. It was the publication of this able and eloquent sermon which first brought Hall into general notice.

In November 1804, Hall was visited by an attack of insanity, from which he did not entirely recover for some years. His state of health made it necessary for him to resign his charge at Cambridge; but, apparently about 1807, he became minister of the Baptist chapel in Harvey Lane, Leicester, and this situation he held for nearly twenty years. He married in March 1808. At last, in 1826, he removed to the pastoral care of his old congregation at Broadmead, Bristol; and here he remained till his death, which took place at Bristol, on the 21st of February, 1831.

Besides occasional contributions to various dissenting periodical publications, Hall published various tracts and sermons in the last twenty years of his life, which, along with those already mentioned, have since his death been collected and reprinted under the title of 'The Works of Robert Hall, A.M., with a Brief Memoir of his Life by Dr. Gregory, and Observations on his Character as a Preacher by John Foster; published under the superintendence of Olinthus Gregory, LL.D., professor of mathematics in the Royal Military Academy,' 6 vols. 8vo., London, 1831–2.

HALL, BASIL, Captain, R.N., was born at Edinburgh in the year 1788. His father was Sir J. Hall, Bart. Basil Hall entered the Royal Navy in 1802; in 1808 received his first commission as lieutenant; in 1814 was promoted to the rank of commander; and in 1817 he was made a post-captain. In 1813, when acting-commander of the Theban on the East India station, he accompanied Sir Samuel Hood in a journey over the greater part of the island of Java. Soon after his return to England, he was appointed to the command of the Lyra, a small gun-brig, in which he accompanied the expedition which took out Lord Amherst as ambassador to China. While the ambassador was pursuing his journey inland to Pekin, Captain Hall in the Lyra visited the places of greatest interest in the adjacent seas, and on his return to England in 1817 he published 'A Voyage of Discovery to the Western Coast of Corea, and the Great Loo Choo Island in the Japan Sea.' Captain Hall was next employed on the South American station in command of the Conway. The period was one of great interest to the Spanish colonies of South America.

Having returned to England early in 1823, Captain Hall published 'Extracts from a Journal written on the Coasts of Chili, Peru, and Mexico, in the years 1820, 1821, and 1822.' In 1825 he married Margaret, youngest daughter of the late Sir John Hunter, Consul-general for Spain; and in April 1827 he and his wife and child sailed for the United States, where they remained above a year, during which Captain Hall travelled nearly nine thousand miles by land and water conveyances. In 1829 he published his 'Travels in North America,' 3 vols. 8vo. He next published 'Fragments of Voyages and Travels.' They form three series, each of 3 volumes, 12mo. In 1834 he met at Rome with a sister of Mrs. Dugald Stewart, who had married Count Purgstall, an Austrian nobleman. He accepted an invitation to visit the countess, and his book 'Schloss Heinfeld, or a Winter in Lower Styria' was the result of his notes during his residence there. Captain Hall's last work was published at the end of the year 1841, in 3 volumes, under the title of 'Patchwork.' It consists of detached papers.

Captain Hall was a Fellow of the Royal Societies of London and Edinburgh, and a member of the Astronomical Society of London. Having been unfortunately seized with mental alienation, he was placed in the Royal Hospital Haslar, Portsmouth, where he died on the 11th of September, 1844.

HALLE, a town in the district of Merseburg and province of Prussian Saxony, stands on the Saale, 53 miles S. by E. from Magdeburg, and 19½ N.W. from Leipzig, by the railway that unites those two cities. Population, 26,000. It is celebrated chiefly for its salt-springs and salt-works, for the orphan asylum founded by the philanthropist FRANCKE, and as the seat of a university. It consists of three towns—Halle itself with five suburbs, and Glaucha, and Neumarkt, which have magistrates of their own. The university was founded in 1694, and united in 1817 with that of Wittenberg. It has a library of above 50,000 volumes, and is famous as the divinity school of the Pietist party among Prussian divines. There are above forty professors and teachers. The university buildings, the churches of St. Mary, St. Ulrich, and St. Maurice, the cathedral, the Red Tower in the market-place, and the town-hall, are the most remarkable structures. The ancient castle of Moritzburg was reduced to a ruinous condition in the Thirty Years' War, and

only a wing now remains. Halle possesses many educational and charitable institutions. There are numerous manufactories, but the most important are the salt-works.

HALLE. [Brabante, South.]

HALLEIN. [Salzburg.]

HALLELUJAH, properly *Hallelu-yah, Halleluia,* or without the inital h Alleluia, a Hebrew compound word, which means 'praise ye Yah or Yehovah,' was used by the Jews in songs of praise and in solemn thanksgivings to God. The word was also used as a name of psalms or hymns in praise of God.

HALLER, ALBERT VON, was born at Berne, October 16, 1708, of an ancient and respectable family. His father, Nicholas Emmanuel von Haller, was an advocate. In early life Haller was feeble and delicate. His father had intended him for the church, but, his own inclination leading him to the study of physic, he went in 1723 to the university of Tübingen. Being but little satisfied with his progress here, he resorted in 1725 to Leyden, where the zeal and talent of the professors afforded him an opportunity of pursuing his studies in a manner more accordant with his wishes. At this university Boerhaave was then in the height of his fame, attended by 120 pupils, whose instruction was his greatest delight; and Albinus was delivering the lectures on anatomy and surgery. At the end of the year 1726 he offered himself for his doctor's degree, and delivered his thesis 'De Ductu Salivali Coschwiziano,' which he showed to be merely a blood-vessel. In 1727 he visited London, where he became acquainted with Sir Hans Sloane and Cheselden; thence he went to Oxford, and thence to Paris, whence, having pursued his anatomical and surgical studies for some time under Winslow and Le Dran, he went to Basel to study mathematics under Bernoulli, and then returned to his native country, and began to practise as a physician. In 1735 he was appointed physician to the hospital at Berne, and soon after principal librarian to the large public collection of books and medals; but these offices he did not hold long, for in the following year he was offered the professorship of medicine, anatomy, botany, and surgery, at Göttingen, by George II., which after some hesitation he accepted. Having declined practising, he devoted himself to the duties of his office with the greatest zeal, and especially exerted himself to increase the facilities for the study of anatomy. During eighteen years that he retained this appointment, while fully discharging all its laborious duties, he was a constant contributor to the different scientific Transactions. In 1747 he published the first edition of his 'Primæ Lineæ Physiologiæ,' which he had that year used as the ground-work of his lectures, having previously employed the 'Institutions' of Boerhaave. In 1751 the Royal Society of Göttingen was established, and Haller, at whose house the first meeting took place, was appointed perpetual president. To their Transactions, of which the first volume appeared shortly after under the title of 'Commentarii Societatis Regiæ Scientiarum Gottingensis,' he was a constant contributor, even after 1753, when, in consequence of the delicate state of his health, being obliged to leave Göttingen, he retired to Berne. Here he resided during the rest of life, constantly occupied in the publication of his most important and voluminous works, in the cultivation of the science of his profession and of general literature, and in the active and honourable discharge of various duties in the service of the republic, in which he at all times strenuously advocated the cause of the aristocracy. He died in October 1777, in the enjoyment of the highest reputation, both as a citizen, a scholar, and a philosopher, his literary labours ceasing only with his life.

Haller was fortunate in receiving the high honours which he deserved during his life time. In 1739 he was appointed physician to the King of England. In 1743 he was elected a fellow of the Royal Society of London, and at different times subsequently of all the scientific societies of Europe. When George II. visited Göttingen in 1748, he was ennobled by the emperor: he was invited by Frederick the Great to settle in Berlin, with a handsome salary, to which no duties were attached, and was offered a professorship at Oxford and at Utrecht. He enjoyed throughout his life the friendship and esteem of the most eminent of his contemporaries throughout Europe.

Some idea of the extent of the works of Haller may be formed from the fact that the titles of nearly two hundred treatises published by him from 1727 to 1777 are given by Senebier in his 'Eloge' of Haller, and that this list does not profess to be complete. He is unanimously received as the father of modern physiology, whose history commences with his writings. He was the first to investigate independently the laws of the animal economy, which had before been studied only in connection with the prevailing mechanical and chemical or metaphysical theories of the day. Commencing with a sound knowledge of anatomy and of the structure of the organs in the dead body, he sought experimentally and systematically to discover the laws which governed their actions during life, proceeding from the most simple to the most complex phenomena. Excluding all the metaphysical explanations which Van Helmont and Stahl had invented, and all those deduced from mechanics and chemistry which were not clearly sufficient for the phenomena ascribed to them, he sought for powers peculiar to the living body, which he believed must govern the actions which he found occurring only in it. These he thought might be restricted to two—sensibility and irritability; the former seated in the brain and nerves, the latter in muscular fibre. But it was soon shown that the restriction of the vital powers to the two, as defined by Haller, was much too exclusive, for that there were many parts which, though they gave no evidence of possessing either of them, were not the less alive, while others to which Haller refused these properties gave sufficient demonstration of possessing them when excited by other and appropriate stimuli. Hence first originated the discovery of the fact that for the action of each organ a peculiar stimulus is required, and that each tissue has, what Bichat, who illustrated it most completely, called, a *vie propre.*

HALLER, JOHANN, a German sculptor, was born at Innsbruck in 1792. He studied in the academy of Munich, and in his third year obtained the prize for a statue of Theseus raising the rock to discover the sandal of his father. He executed many works in Munich for the late King of Bavaria, both as prince and king; the principal of which are the models of the sculptures for the pediment of the Glyptothek, representing Pallas Ergane (Ἐργάνη, the 'worker'), from a design by Wagner; the six colossal statues of the niches in the front of the same building; and the Caryatides of the royal box of the great theatre at Munich; besides a basso-rilievo in the interior of the Glyptothek after a design by Cornelius, representing the Fall of the Giants; and many busts of eminent men, some of a colossal size. He executed the bust of William III. of England for the Walhalla. He died in 1826, aged only 33. He studied some time in Rome.

HALLEY, EDMUND, was born Oct. 29, 1656, at Haggerston, near London, at a country-house belonging to his father, who was a soap-boiler in London. He was educated at St. Paul's School, under the care of Dr. Gale, and was placed at Queen's College, Oxford, in 1673, being then possessed of much erudition for his age, and a strong turn for observation, as appears by his having discovered for himself before he left school the alteration in the variation of the magnetic needle. At the university, being well supplied with instruments by his father, he began to apply himself to astronomy, and before he reached the age of twenty he had given (in the 'Phil. Trans.') a memoir on the problem of Kepler, had invented a method of constructing the phases of a solar eclipse, and had made many observations, particularly of Jupiter and Saturn. Finding however that nothing could be done in planetary astronomy without more correct tables of the stars, and relying upon Flamsteed and Hevelius for the amelioration of the northern catalogues, he determined, with his father's consent and assistance, to appropriate to himself the task of forming a catalogue of the southern hemisphere. Furnished with a recommendation from Charles II. to the East India Company, he set sail for St. Helena in November 1676, and remained there two years. His 'Catalogus Stellarum Australium,' published in 1679, was the result of this voyage, and contains, besides the positions of 350 stars, some other points of interest, particularly an observation of the transit of Mercury over the sun's disc, and a hint that such observations might be employed to determine the sun's parallax (afterwards so successfully carried into effect with the planet Venus). He also notices the increased curvature of the moon's orbit when in quadratures, which was afterwards explained by Newton. In his voyage out he had observed the fact that the oscillations of a pendulum increase in duration as the instrument approaches the equator.

On his return from St. Helena, the king granted him a mandamus to the university of Oxford for the degree of Master of Arts, and he was elected a Fellow of the Royal Society. This body sent him to Danzig in 1679 to judge of the observations of Hevelius, who maintained the superior accuracy of instruments with simple sights in opposition to Hook, who advocated the use of the telescope. Halley was a man of rapid movements: in November 1678, he returned from St. Helena; in May 1679, he set out for Danzig, having in the interval published his catalogue, and procured his Oxford degree, and admission to the Royal Society. He returned from Danzig in July, and remained at home till the end of 1680, at which time he set out on a continental tour, accompanied by his schoolfellow Mr. Nelson, since well known as the author of a work on the Feasts and Fasts. In December, being on the road to Paris, he saw the celebrated comet of 1680 in its return from perihelion, being the first who perceived it since it was lost in the preceding month. This body he observed with Cassini at Paris, and the observations thus made are remarkable as forming part of the foundation upon which Newton, in the 'Principia,' verified his deduction of a comet's orbit from the theory of gravitation. He returned to England at the end of 1681, and in 1682 married the daughter of Mr. Tooke, auditor of the Exchequer, with whom he lived fifty-five years. He resided at Islington till 1696, and in 1683 published his theory of the variation of the magnet, followed by other papers in subsequent years, containing ingenious speculations, now forgotten. His astronomical occupations during this period consisted chiefly of lunar observations and comparisons. He was strongly of opinion that the moon would, when sufficiently known, furnish the means of finding the longitude, and at this period it seems that he had formed the idea of observing that body through a whole revolution of the nodes.

Among other objects of speculation he had considered the law of attraction, which he imagined must be as the inverse square of the distance. Having applied in vain to Hook and Wren for assistance in the mathematical part of the problem, he heard of Newton, and paid him a visit at Cambridge. Finding all he wanted among the papers of his new friend, he never rested until he had persuaded Newton to publish the 'Principia,' of which he superintended the printing, and supplied the well-known copy of Latin verses which stand at the beginning. In 1691 he was a candidate for the Savilian professorship, which he lost, according to Whiston, on account of his avowed disbelief of the Bible.

In 1698 King William, who had heard of his magnetic theory, gave him the commission of captain in the navy, with the command of a small vessel, and instructions to observe the variation of the magnet, and the longitude and latitude of places in the American settlements, and to attempt the discovery of land south of the Western Ocean. He set out in November, but was compelled to return by the insubordination of his first lieutenant. Having tried this officer by a court-martial, he set out again in September, with the same ship and another, observed in many parts of the Atlantic as far as the ice would permit, touched at the Canaries, Madeira, Cape de Verd Islands, St. Helena, Brazil, Barbadoes, and returned September 1700, without having lost a man by sickness

during the whole voyage. He published in 1701 a chart of the variation of the magnet in all seas of the known world, and immediately afterwards sailed to survey the coasts of the Channel, of which he also published a chart. He was then twice successively ordered to the coast of the Adriatic, to assist in the formation and repairs of harbours in the emperor's dominions, and returned to England in November 1703, just in time to succeed Dr. Wallis, who had died a few weeks before, in the Savilian chair of geometry at Oxford.

If Halley was active and energetic, he was no less universal. The captain-professor found an unfinished translation by Dr. Bernard of a tract of Apollonius, and, though he did not understand Arabic, undertook to complete the work. We must also mention the splendid edition of the whole of Apollonius, published in 1710.

The 'Miscellanea Curiosa,' a collection of pieces, mostly from the 'Philosophical Transactions,' many of them by himself, was superintended by him, and published in 1708.

From the manner in which his name is mixed up with the affair of Flamsteed, he must have resided in town for some years previous to 1713. [FLAMSTEED.] In the article cited we have called Flamsteed's work the Principia of practical astronomy; and it were to be wished the connection of Halley with the printing of this one had been as creditable as that which links his name with the 'Principia' of Newton. It is difficult to say to what extent Halley was involved in originating any of the unworthy proceedings to which we allude; and we must protest against his being made a scapegoat for Newton, in which position even Flamsteed seemed inclined to place him, as well as several more recent writers on the controversy. Neither the position nor the character of Halley renders it likely that he would prefer making a tool of Newton to any direct mode of aggression. The committee appointed by Prince George of Denmark must bear the blame of all the formal proceedings; and in that committee the name of Halley is not found, though it is on the list of those who published the 'Commercium Epistolicum,' a position which we cannot defend.

At the beginning of 1720, after the death of Flamsteed, Halley was appointed astronomer-royal. [GREENWICH OBSERVATORY.] He died Jan. 14, 1741–42, in the 86th year of his age.

Among the Englishmen of his day Halley stands second only to Newton, and probably for many years after the publication of the 'Principia' he was the only one who both could and would rightly appreciate the character and coming utility of that memorable work.

In astronomy we owe to Halley—1. The discovery and the detection of the amount of what is called the *long inequality* of Jupiter and Saturn, which he confidently expected would be shown to be a consequence of the law of gravitation, as was afterwards done. 2. The detection, by comparison of ancient and modern observations of eclipses, of the slow acceleration of the moon's mean motion. 3. The first prediction of the return of a comet. [HALLEY'S COMET.] 4. The explanation of the appearance of Venus in the daytime at particular seasons, arising out of the now well-known method of estimating the brilliancy of the planet. 5. The recommendation to observe the transit of Venus for the determination of the sun's parallax.

The following list of the most remarkable labours of Halley out of astronomy, arranged in the order of publication, will instruct the reader to what articles to look for further information:—1. On the variation of the compass. 2. The law according to which the mercury falls in the barometer while the instrument ascends, being the first application of this instrument to the measurement of heights. 3. Theory of the trade-winds. 4. Construction of equations of the third and fourth degree. 5. Estimation of the quantity of vapour raised from the sea. 6. Inquiry into the point at which Julius Cæsar made his entry into Britain. 7. Tables of mortality, from observations made at Breslau, the first of the kind constructed. 8. Application of algebra to the problem of lenses. 9. Method of constructing logarithms, a celebrated paper, reprinted in Sherwin's 'Logarithms.' 10. Improvements in the diving-bell. Those papers only have been cited which refer to points on which Halley's name is inseparably connected with the history of the progress of science.

HALLEY'S COMET, the first of the comets which was proved to be a constituent part of the solar system, and to revolve regularly round the sun, deriving its name from HALLEY, the astronomer, who first discovered that it had made several revolutions within the æra of correct astronomical observation, and predicted the year of its return.

The 'Astronomiæ Cometicæ Synopsis' of Halley was published in the 'Philosophical Transactions' for 1705, and in several other forms. This work was a consequence of the 'Principia' of Newton, in which the method of applying Kepler's laws to the computation of the parabolic orbit of comets, the idea of the possibility of a periodic comet, and even an implied assertion that such things would be discovered, is to be found. Halley, acting upon this hint, collected the observations of all such comets as had been observed with any degree of accuracy up to the year 1700.

On looking over the list, it needed only a glance to see that three of these comets (in 1531, 1607, and 1682) exhibited very nearly the same orbit, and that the intervals of the appearances were very nearly the same.

The interval between the perihelion passages of the first and second comet is fifteen months longer than that between the second and third, which might have puzzled a person not acquainted with the 'Principia.' But the disturbing action of the planets, which has since been so successfully computed that the motion of this body is now much better known than was that of the moon in the time of Halley, immediately suggested itself. He announced accordingly the return of the comet about the year 1758.

In the latest edition of the 'Synopsis' Halley examined the elements of the comet's orbit fur-

ther, and repeated his prediction still more confidently, desiring that all would remember that its author was an Englishman.

The prediction of Halley caused various astronomers to compute orbits of the coming comet, but none of these took into account the perturbations caused by the planets. In 1757 Clairaut and Lalande undertook the enormous labour of computing the effect of the perturbations of the principal planets through a period of 150 years. Assisted by Madame Lepaute, wife of a well-known watchmaker of that name, Lalande performed the drudgery of the process, while Clairaut, the first who extended Newton's application of his theory, applied the results. The consequence was, that in November 1758, when the comet was already expected, the announcement was made that it would arrive at its perihelion within a month, one way or the other, of April 13, 1759. The announcement of Clairaut was just in time, for on December 25, 1758, George Palitzch, a farmer and amateur astronomer in the neighbourhood of Dresden, detected the comet. It was afterwards repeatedly observed in various parts of Europe, but it is not on record that any one saw it with the naked eye, nor was its position at all favourable for that purpose. Various orbits were computed, but no one seemed inclined to undertake the task of applying the corrections for perturbation, so as to predict the perihelion place for 1835. The comet slept in peace therefore until the improvement of methods of computing the perturbations, and the approach of a new appearance.

The comet was first seen at Rome on the 5th of August, 1835, at the observatory of the Roman college. From that time it continued to be observed till the end of the year in Europe, and through a great part of the ensuing spring in the southern hemisphere. During a part of the time it was distinctly visible to the naked eye. The number of good observations which were procured greatly exceeded, as might be supposed, those made on any previous occasion.

The history of the last appearance of Halley's comet is not yet completed, nor can it be until the reduction and comparison of all the observations are made to produce a new determination of the elements of 1835. Those who have collected the materials, both theoretical and practical, to which we have alluded, have been working for posterity; and it is the year 1911 which must show the progress of astronomy between 1759 and 1835, just as the year 1835 was evidence of the change which took place between 1682 and 1759.

HALLUIN. [Nord.]

HALO is a circular band of faintly coloured light which is occasionally seen surrounding the disk of the sun or moon at a distance from it equal to 22 or 23 degrees. The colours of the solar halo are such as are observed in the rainbow, but they are less bright, and they do not always, in the halo, follow the same order as in the bow. The lunar halo in general appears to be white, but it is at times tinted with pale green or red. Often about either luminary the halo is double, consisting of two concentric circular bands, the exterior one being broader than the other.

When a mist or a thin cloud is between the sun or moon and a spectator, there is frequently observed an ill-defined circle of coloured light immediately surrounding the disc of the luminary; this is called a corona; it sometimes appears when a halo is also seen, but it is more commonly observed without such accompaniment. It is supposed to be produced by the refractions of light in the globules of water which are suspended in the atmosphere between the spectator and the luminary.

It may be observed, in this place, that images of the sun have been occasionally seen as if by reflection from some cloud, the sun being near the horizon: these are called anthelia; and they are supposed to be produced by the reflections of light in prisms of ice having their axes in vertical positions.

Halos are frequently accompanied by a horizontal ring or band of whitish light passing through the sun or moon; and at times a similar band appears in the direction of a diameter perpendicular to the horizon. At the intersections of these bands with the halo are sometimes seen images of the sun or moon, which are ill defined and less bright than the true disc of the celestial body; these, when the halo is formed about the sun, are called parhelia; and, when about the moon, paraselenæ. Occasionally also segments of circles, or branches of curves of contrary flexure, proceed from these images of the sun or moon so as to assume the appearance of wings or tails.

Many remarkable phenomena of this kind have at various times been observed: in the 'History of England,' by Matthew Paris, there is a description of a halo with four false suns, which is stated to have been seen in the year 1233, on the borders of Herefordshire and Worcestershire. In 1586 Rothman observed at Cassel, soon after sun-rise, a false sun above, and one below the true sun, all being in one vertical line; and in 1661 Hevelius at Danzig observed a double halo accompanied by three false suns, and by several segmental bands of light, two of which had false suns at their places of intersection. In the last-mentioned year Hevelius also observed a halo with two paraselenæ and a double corona encircling the body of the moon; and a very remarkable halo was seen by Sir Henry Englefield at Richmond, in 1802 ('Journal of the Royal Institution,' vol. ii.). Besides these, many such phenomena have been observed in Europe, in the United States, and in Canada; and Captain Parry observed and measured several during his voyages to the arctic regions. One of these was a great double halo with a horizontal circle of light, at the intersections of which with the interior halo were parhelia; and there were segments of circles both at the upper extremities of the two halos and at the lower extremities of the exterior one, the latter being incomplete. Above the sun, and between the two halos, was a small portion of a third halo, which appeared to be elliptical; and the space between the two segments was extremely brilliant, in consequence of strong reflections of the sun's rays from the snow which floated in the atmosphere.

In the tropical regions coloured halos are frequent and, brilliant; and, near the equator, Humboldt has observed small ones surrounding the planet Venus.

The explanation which has been given of the halo by Mariotte and Dr. Young is nearly as follows:—Between the spectator and the sun innumerable crystals of snow or ice, having nearly the form of equilateral prisms, may exist in the air, in all possible positions: of these vast numbers may have their transverse sections in planes nearly passing through the sun and spectator; and it will follow, after two refractions at the edges, that the deviation of the refracted from the incident ray, at the eye of the observer, is about equal to the semi-diameter of the halo. This taking place in all planes so passing, a circle of refracted light is seen. Mr. Cavendish suggests that the exterior halo may be produced by the two refractions which a ray would undergo in passing through a face and one end of a prism, that is, through two surfaces which are at right angles to one another.

Plates of ice disposed so as to reflect the sun's light in a vertical plane may be the cause of the column which is sometimes seen to form a vertical diameter of a halo; and the blending of the reflected rays with the rays refracted from the sides of the prisms, at the places where the horizontal and vertical bands of light intersect the halo, is, apparently, the cause of the parhelia which are very generally observed in those parts of the halo. When the transverse sections of the refracting prisms deviate from a plane passing through the observer, towards the right or left, the axes being horizontal, there will be produced a curvilinear band of light, like a wing, inclining upwards on either side of a parhelion.

HALO'NIA, a genus of fossil plants, allied to *Lepidodendron*, and occurring in the coal formation.

HALORA'GEÆ, a small group of exogenous plants, many of which inhabit watery places, and all of which have minute inconspicuous flowers. They are often considered to form a peculiar section of *Onagraceæ*, or, if separated from that order, are at least stationed in the immediate vicinity of it. Upon this supposition, they are looked upon as an imperfect condition of the onagraceous type.

HALS, FRANCIS, an eminent portrait-painter, born at Mechlin, 1584, died in 1666. He devoted himself almost exclusively to portrait-painting, and in that department no artist of his time was superior to him except Vandyck, and very few could be compared with him.

HALSTED. [Essex.]

HALYS. [Kizil Ermak.]

HALYSITES, the name given by Fischer to a genus of fossil corals, synonymous with *Catenipora* of Goldfuss.

HAM, EAST and WEST. [Essex.]

HAM. [Somme.]

HAMADAN. [Ecbatana.]

HAMAMELA'CEÆ, or HAMAMELI'DEÆ, a very small group of woody exogenous plants. There are only three genera in the gardens of this country, *Hamamelis*, *Trichocladus*, and *Fothergilla*. Some of the species are large forest trees, affording good timber, but nothing is known of any other useful property in the order.

HAMBURG, a large city in Germany, the most important centre of commerce in that country, is situated in 53° 32′ 51″ N. lat., 9° 58′ 37″ E. long., 184 miles by railway N.W. from Berlin. Its origin is attributed to Charlemagne. The founder chose for its site the most elevated spot on the north bank of the Elbe and the east bank of the Alster, about 75 miles from the German Ocean. It was several times destroyed by the neighbouring barbarians, yet it always recovered, and had attained considerable commercial importance at the beginning of the 12th century. In the 13th century it concurred in the formation of the Hanseatic League. [Hanseatic League.] By degrees it extended widely on both sides of the Alster. Its rights as an estate of the empire were long contested by the Danish kings, who claimed the sovereignty over it as counts of Holstein, and it was not until 1618 that its rights were recognised. It did not however obtain a seat or vote in the Diet of the German Empire till 1770. From 1802 till 1815 Hamburg was scarcely free for a year from French domination and exaction, and it suffered most severely. In 1815 Hamburg joined the German Confederation as a free Hanseatic city. For all its severe sufferings, including the robbery of the bank, a very inadequate indemnity was obtained from France at the peace. But the public spirit of the inhabitants, its internal resources, and its favourable situation have gradually restored its former prosperity.

The territory of Hamburg, including the area of the city, is about 150 square miles, bounded by the Elbe, and on the other sides by the Danish territories. It has likewise some islands in the Elbe, some parcels of land on the Hanoverian side of the river, and the bailiwick of Ritzebüttel at the mouth of the Elbe, in which is the harbour of Cuxhaven. Conjointly with Lübeck it has the bailiwick of Bergedorf, and the districts called Vierländen, 16 miles from Hamburg. The population of the territory, including that of the city, and its two faubourgs, St. George and St. Paul, is 188,054, of which number the city itself contains about 123,000. The great majority are Lutherans.

The constitution is a mixture of aristocracy and democracy. The senate, consisting of four burgomasters and twenty-four senators, with four syndics and four secretaries, has the executive power, and the sole right of proposing laws; but no laws can be made and no taxes imposed without the consent of the citizens in common hall. The citizens are divided into five parishes, each of which chooses 36 members to the council of 180, consisting—1, of 15 elders, who are the guardians of the laws, and have the affairs of the churches and the poor under them; 2, of 45 deacons, 9 from each parish, who with the elders form the council of 60; and 3, of 24 subdeacons from each parish: all these are obliged to appear in the common hall, where at least 200 citizens must be present. From this council is chosen the board of 60, and out of that the 15 elders or aldermen. In the German Diet Hamburg has one vote in the deliberations,

but in the select council it has a vote only in common with Lübeck, Bremen, and Frankfort.

As in most of the old fortified towns of Germany, the streets are in general narrow, irregular, and dark; the houses old-fashioned and awkward. In the year 1842 however a fire occurred which destroyed 61 streets and 1749 houses, and the new streets since built far exceed the old in architectural appearance. The place of worship most worthy of notice is the great church of St. Michael, begun in 1751 and completed in 1762, except the spire, which was not erected till 1778. This church, built by Sonnin, is the pride of Hamburg; it is capable of accommodating 2000 persons: the height of the steeple is said to be 423½ feet. The other churches are not remarkable. The Exchange, the Bank, the Observatory, and the Theatre, are among the chief public buildings. The charitable institutions are numerous, and on a most liberal scale. There are only two learned institutions supported by the state—the Johanneum, designed to qualify young men for the university, and the gymnasium. Hamburg has been the birth-place of many learned men, and the chosen residence of many others. Its numerous literary institutions, its private collections of paintings, the general taste for music, the fondness for the study of foreign languages prove that the whole attention of the inhabitants is not absorbed by thirst of gain. The principal public library, called the City Library, contains nearly 200,000 volumes, besides 3000 volumes of MSS.

The arm of the Elbe, next the town, is narrow, but the two harbours are capable of receiving a considerable number of ships. The old town is so intersected with canals as to resemble a Dutch city; the canals are filled chiefly by the Elbe, but partly by the Alster, and almost all the warehouses are close to them. The Alster forms on the north side of the town a fine basin, on the south side of which is the finest line of houses in the city, with a spacious walk, the Jungfernsteig, planted with trees. Since the peace, this favourite promenade has been continued along the west side of the basin, so as to join the ramparts, the whole of which are beautifully laid out as a public garden and promenade all round the city. North of this Inner Alster is the Outer Alster, a very large basin, on the banks of which are numerous fine country-seats.

Hamburg has a very important and extensive commerce, its port being the main channel of communication between North Germany and foreign countries. The number of vessels that entered from the sea from 1840 to 1844, both inclusive, gives an annual average of 3252 ships, and of 481,000 tonnage, being an increase in the navigation of above 125 per cent. in the space of 30 years. In 1845 the entries from the sea were 3990 ships, as follows:—

435 from Transatlantic ports.
1566 from British ports.
1989 from other European ports.

Of the values of the commodities imported by this mass of shipping we have no specific returns; but, taking imports and exports together, the sea-borne trade of the year was about 22½ millions sterling, and the aggregate value of sea and river trade amounted to nearly 35 millions sterling. The following tables give a more specific view of the trade of Hamburg. Taking entries and departures of vessels together, the sea and river navigation shows the following results:—

	1842.	1843.	1844.
Entries and Departures.	15,277	15,634	14,393
Tonnage . . .	1,373,843	1,382,973	1,273,668

The aggregate values of imports and exports by sea, river, and land carriage in these years stood thus:—

1842.	1843.	1844.
35,600,000*l.*	34,765,000*l.*	34,010,000*l.*

For 1844 the value of the imports amounted to 17,557,000*l.*, the exports to 16,453,000*l.*; of the former Prussia supplied 4,621,650*l.*, Great Britain, 4,852,500*l.*, Hanover, 2,280,250*l.*; and the values of exports to these countries were, respectively, 4,669,500*l.*; 3,367,250*l.*; 2,880,000*l.* The number of ships that entered seaward in 1846, a year of extraordinary activity in the corn trade, was 4476; in 1847 the number was 3756; and perhaps the falling off here noticed is in part owing to the competition resulting from railways.

The imports are composed chiefly of sugar, coffee, raw and manufactured cotton, cotton yarn, tobacco, hides, dye-stuffs, wine, brandy, tea, rum, spices, &c. The exports comprise grain of all sorts, wool, seeds, bark, spelter, butter, salt provisions, rags, wooden clocks, linens, all kinds of German manufactures, Rhenish wines, &c. Hamburg possesses 547 ships, including a few steamers. It has regular steam communication with London, Amsterdam, &c.; steamers daily ascend the Elbe to Magdeburg.

(J. L. v. Hess, *Hamburg, Topog. Polit. Histor.*; K. J. H. Hutte, *Ansichten der Stadt Hamburg*; H. E. Lloyd, *Hamburg*, &c.; M'Culloch's *Commercial Dictionary*; *Trade Returns.*)

HAMELN. [Calenberg.]

HAMILCAR, BARCAS, the leader of the popular party at Carthage, was appointed in the eighteenth year of the first Punic War (B.C. 247) to the command of the Carthaginian forces. He ravaged with his fleet the coasts of the Bruttii and the Epizephyrian Locrians, and afterwards seized upon a strong fortress in Sicily, between Eryx and Panormus. In this place he maintained himself for some years. He frequently ravaged the southern coasts of Italy as far as Cumæ, and defeated the Roman troops in Sicily. The Romans at length fitted out a fleet to cut off all communication between Hamilcar and Carthage; the Carthaginian fleet sent to his assistance was defeated by the Roman consul, Lutatius Catulus (B.C. 241), and the Carthaginians sued for peace, which was granted by the Romans; and Hamilcar led his troops to Lilybæum, whence they were conveyed to Africa. But a new danger awaited Carthage. The Carthaginian treasury was exhausted; and it was proposed to the troops that they should relinquish a part of the pay which was due to them.

The soldiers rejected the proposal, and proceeded to enforce their demands. Being joined by many of the native tribes of Africa, they defeated Hanno, the Carthaginian general sent against them, and brought Carthage to the brink of ruin. Hamilcar, being appointed to the command, succeeded in subduing them after the war had lasted above three years.

Hamilcar was sent into Spain (B.C. 238), where he remained nearly nine years, during which time he extended the dominion of Carthage over the southern and eastern parts of that country. He fell in a battle against the natives, B.C. 229.

Hamilcar was succeeded in his command in Spain by his son-in-law Hasdrubal, who must not be confounded with Hasdrubal, the brother of Hannibal. He carried on the conquests of Hamilcar, and reduced almost the whole of the country south of the Ibérus (Ebro), which river was fixed by a treaty between the Carthaginians and the Romans, B.C. 226, as the frontier of the Carthaginian dominions. Hasdrubal was murdered in his tent by a Gaul, B.C. 221. (Polybius, b. i. ii.; Appian; Nepos.)

HAMILTON. [LANARKSHIRE.]

HAMILTON, A. [GRAMMONT.]

HAMILTON, GAVIN, descended from a noble family of Scotland, spent the greater part of his life at Rome. Though not perhaps gifted with eminent genius for invention as an artist, yet a liberal education and refined taste enabled him at least to equal his most distinguished contemporaries. This is manifest in several subjects which he painted from the 'Iliad.' He made excavations in many parts of the Roman territory, especially at Tivoli, in Hadrian's villa. In the Museo Clementino, the statues, busts, and basreliefs contributed by him form the most important portion, next to the treasures of the Belvedere; and many great collections in Russia, Germany, and England are indebted to him for their chief ornaments. The 'Townley Gallery,' published under the superintendence of the Society for the Diffusion of Useful Knowledge, contains a list of the marbles procured by him for the collection of Mr. Townley. Neither the date of his birth nor death is certainly known; he died however between 1790 and 1800.

HAMILTON, SIR WILLIAM, a well-known diplomatist and lover of art, was born in Scotland in 1730. He began life, he says, 'with an ancient name and 1000*l.*,' but removed the discrepance between his name and his fortunes by marrying in 1755 a lady of very large property. It is said that he was foster-brother to George III., which may account for his appointment in 1764 to be English ambassador at Naples, whence he was not recalled till 1800. He was made a Knight of the Bath in 1771, and a privy-councillor in 1791. He died, much impoverished, in England, April 6, 1803.

His great work, the 'Campi Phlegræi,' Naples, 1776–7, 2 vols. fol., is a noble monument of his researches into volcanic phenomena. Ten papers by him, upon matters observed during his abode in Italy, are printed in the 'Phil. Trans.' for the years 1767 to 1795 inclusive. His other works are, 'Observations on Mount Vesuvius, Mount Etna,' &c., Lond. 1772; and 'Lettera sul Monte Volture,' Naples, 1780.

HAMILTON, WILLIAM, of Scotch descent, but probably born in London, studied at a very early age under Zucchi, the painter of ornaments, at Rome. After his return he soon obtained general employment. He was engaged in all the public works, such as the Shakspere Gallery, Macklin's Bible, &c. He excelled in ornament, to which he gave propriety, richness, and a classic appearance. He died in 1801, at the age of fifty.

HAMILTON, ELIZABETH, born at Belfast in Ireland, but probably of Scottish parentage, filled the office of governess to the daughters of a Scottish nobleman, for the eldest of whom her 'Letters on the Formation of the Religious and Moral Principle' were written. She died July 25, 1816.

The following are her chief works:—'Letters of a Hindoo Rajah,' 1796; 'Modern Philosophers,' 1800; 'Letters on the Elementary Principles of Education,' 1801–2; 'Life of Agrippina,' 1804; 'Letters on the Formation of the Religious and Moral Principle,' 1806; 'Cottagers of Glenburnie,' 1808; 'Exercises in Religious Knowledge,' 1809; 'Popular Essays,' 1813. Of these the 'Letters on Education' is the most sterling and important.

HAMILTON, DAVID, a Scotch architect, to whom Glasgow is indebted for its chief modern edifice (the Exchange) and some other buildings, was born in that city, May 11, 1768. Of his professional education and earlier studies little is known.

Hamilton entered into the competition for the New Houses of Parliament, on which occasion one of the four 500*l.* premiums was awarded to him for his designs. He died at Glasgow, December 5, 1843, in his seventy-sixth year.

HAMITES, a genus of cephalopodous Mollusca proposed by Mr. James Sowerby. ('Min. Conchology of Great Britain.') It includes only fossil species, and is yet incompletely understood. According to the original views of Mr. Sowerby, only those chambered shells belong to *Hamites* which have the form of a hook or siphon bent in one plane with parallel but unequal limbs, and sinuous septa. But the specimens having these characters appear always imperfect; and when Professor Phillips found in Yorkshire many fossils, in other respects perfectly resembling *Hamites* described by Mr. Sowerby, rolled in a plane spiral, the volutions in some species touching, in others free, and in a few terminating in a straight elongation (like spirula), he extended the use of the term. Dr. Buckland has adopted this view in his 'Bridgewater Treatise.'

In the 'Transactions of the Geographical Society of France,' June 11, 1837, M. Leveillé gives descriptions and figures of species of fossil Cephalopoda, which might be considered as the spiral part of Hamites (Phillips), and names them *Crioceratites*. Bronn adopts this genus. Mr. Sowerby has recently been led to very similar results, and has proposed to call the same group *Tropæum*.

Hamites of the typical forms occur at Folkstone, Hamsey, and other situations in the gault, greensand, and other cretaceous beds. Crioceratites and Tropæum belong chiefly to the same groups of rocks in England, France, Switzerland, &c.

HAMMERFEST. [Norway.]

HAMMERSMITH. [Middlesex.]

HAMMOND, HENRY, a learned divine of the church of England, was born at Chertsey, in Surrey, Aug. 18, 1605. Having been educated at Eton and Magdalen College, Oxford, of which he became Fellow, he was presented to the rectory of Penshurst in Kent, in 1633, ten years after which he was appointed archdeacon of Chichester. He was appointed canon of Christchurch and public orator in 1645, and attended Charles I. as his chaplain from the time when he fell into the hands of the army until the end of 1647. He then returned to Oxford, and was chosen sub-dean of Christchurch, from which situation he was expelled, in March 1648, by the parliamentary visitors, and placed for some time in confinement. He died after long suffering from a complication of disorders, April 25, 1660. Of his numerous works, chiefly controversial, the following are some of the most remarkable: 'Practical Catechism,' 1644; 'Humble Address to the Right Hon. the Lord Fairfax and his Council of War,' 1649, concerning the impending trial of Charles I.; 'Paraphrase and Annotations on the New Testament,' 1653, best edition, 1702. He began a similar paraphrase of the Old Testament, but advanced no farther than the Psalms, 1659, and one chapter of Proverbs. His works, in 4 vols. folio, were collected by his amanuensis Fulman, 4 vols. folio, 1674–84.

HAMMOND, JAMES, was the second son of Anthony Hammond, Esq., of Somersham Place, in Huntingdonshire. He was born in 1710, and educated at Westminster; he sat in parliament for Truro, on the interest of the Prince of Wales, whose equerry he was. He died in 1742.

His verses are mostly elegiac, and addressed in the vapid style of pastoral sentiment, then in fashion, to a fictitious object, whom he names Delia. He is said to have been in love with a Miss Dashwood, who refused him, and to have lost his intellects in consequence.

HAMOAZE. [Plymouth.]

HAMPDEN, JOHN, the eldest son of William Hampden, of Hampden, in Buckinghamshire, and Elizabeth, daughter of Sir Henry Cromwell, and aunt of the Protector, was born in London in 1594. He was educated at a grammar-school at Thame, afterwards at Magdalen College, Oxford, and in 1613 was admitted a student in the Inner Temple. In 1619 he married Elizabeth, only daughter of Edmund Symeon.

In the first short parliament to which he was elected (for the borough of Grampound) Hampden took no very forward part in the business of the house. At the close of Charles I.'s second parliament, the king required a general loan; to this Hampden resolutely refused to contribute, denying the king's right to demand it. In consequence he was imprisoned, but was afterwards, with seventy-six others, liberated by an order of council. His resistance to the imposition of ship-money (1636) induced many to follow his example. Proceedings were instituted against him. The case was argued in the Exchequer Chamber (1637) during twelve days before all the twelve judges, who, two excepted, gave a decision in favour of the crown.

For an account of Hampden's conduct generally in the Long Parliament we must refer to Lord Nugent's 'Memorials of Hampden,' to Clarendon, Whitelock, and the general histories. At the commencement of the civil war he raised and commanded a troop, with which he joined the parliamentary army. His counsel was for vigorous and resolute attack; he considered that Essex, the parliamentary general, should have acted more on the offensive. In an engagement with Prince Rupert upon Chalgrove Field, June 18, 1643, Hampden placed himself at the head of the attack, but in the first charge received his death-wound.

HAMPSHIRE, a county of England, lying between 50° 34′ and 51° 22′ N. lat., and 0° 43′ and 1° 54′ W. long. It includes the Isle of Wight. [Wight, Isle of.] Hampshire is bounded N. by Berkshire, E. by Surrey and Sussex, S. by the English Channel, and W. by Wiltshire and Dorsetshire. The length of the mainland portion of the county from N. to S. varies from 37 to 46 miles; the breadth from 28 to 41 miles. It is separated from the Isle of Wight by an arm of the sea averaging about 3 miles across. The area of the county, including the Isle, is 1625 square miles, or 1,040,000 acres. The population in 1841 was 355,004.

Surface, Geology, &c.—The coast is low towards the east, where there is a wide bay or inlet, divided by Hayling Island and Portsea Island into three parts; Chichester Harbour on the east, Langston Harbour in the middle, and Portsmouth Harbour on the west. The coast from Portsmouth Harbour to Southampton, up the Southampton Water, is mostly flat; as is also the further portion, westward, which forms Christchurch Bay.

The surface of this county is rather irregular. The South Downs enter it from Sussex on the south-east, near Petersfield, and cross it in a north-west direction into Wiltshire. The North Downs enter the county from Surrey near Farnham, and extend across by Odiham, Basingstoke, and Kingsclere, into Wiltshire. The Alton Hills form a connection on the east side of the county between the South and North Downs, and run from Petersfield northwards past Alton. Portsdown is an isolated eminence extending east and west just above Portsmouth and Langston harbours; its height is about 447 feet; its length 7 miles, and its breadth one.

A large part of Hampshire is within the basin of the Southampton Water; a small portion on the north and north-east sides is in the basin of the Thames; a small portion on the south-east side is in the basin of the Arun; and a small portion of the west side is in the Wilts and Dorset basin. The principal streams which drain the Southampton basin are the Anton, or Test, the Itchin, and the Hamble. One branch of the Test rises near Hurstbourne Tarrant, and another near Whitchurch; their united stream flows by Stock-

bridge and Romsey to Southampton. The Itchin rises in the hills around Alresford, and flows past Winchester to Southampton. The Hamble rises near Bishop's Waltham, and joins the Southampton Water some miles below Southampton. The Beaulieu River and the Boldre Water flow through the New Forest. None of these are above 35 miles long. The Wey, the Auborne, and the Loddon flow into the Thames basin; the Rother into the Arun basin; and the Avon and Stour flow into the Wilts and Dorset basin.

The county has two principal canals. The Andover Canal commences at Andover, and extends to Redbridge, three or four miles above Southampton, where it enters the Anton; it sends off a branch to Salisbury, and is 22½ miles long. The Basingstoke Canal commences at Basingstoke, and runs 22 miles through Hampshire, in its course towards the river Wey. The South-Western Railway enters the county at Farnborough, and extends to Southampton. There are also in this county the Bishopstoke and Gosport Branch, the Farnham and Portsmouth Branch; and portions of the Bishopstoke and Salisbury, Basingstoke and Salisbury, Reading and Basingstoke, Farnham and Alton, Brighton and Portsmouth, and Southampton and Dorchester railways.

That vast district of chalk which overspreads so large a portion of Wiltshire, and of which Salisbury Plain forms a part, extends into Hampshire and occupies a considerable part of it, constituting the North and South Downs, and Portsdown. North of the chalk the strata belong to the London basin; south to the Isle of Wight basin; east to the Weald strata; west, to the chalk of Wilts and the plastic clay of Dorset.

The New Forest in this county has varied in area from time to time: at present it includes 64,000 acres, and is the property of the crown, subject to rights of common and other ancient claims. The crown has also manorial rights over some, and the absolute property of other plots of ground included in the former, but not in the present bounds of the forest. For local purposes the forest is divided into nine bailiwicks, which are subdivided into fifteen walks. Much of the oak and beech timber for the navy is grown here. Bere Forest extends northward from Portsdown Hill, and its bounds comprehend about 16,000 acres, of which one-third is inclosed. Alice Holt and Woolmer Forest contain together about 15,500 acres. Alice Holt contains much valuable growing timber, but Woolmer Forest, except a few patches of modern plantations, is a barren moor. Besides these forests there is a waste of about 2000 acres, called Waltham Chase, situated near Bishop's Waltham.

Climate and Agriculture.—The climate of Hampshire is generally mild, and favourable to vegetation.

The northern part of the county consists chiefly of the poor dark sand, mixed with an ochreous loam, which is well known as the Bagshot-Heath soil. It is naturally very unproductive, and till within a few years was almost entirely covered with a brown heath, on which some hardy forest sheep and a few miserable cattle were reared, and contrived to pick up a scanty living; but a good deal of heath has recently been brought into cultivation. South of this district the chalk prevails, better adapted for pasture than for corn culture.

In the valleys and along the lower slopes of the chalk-hills the soil is of a tough tenacious nature, being a mixture of stiff clay with chalk washed down the hills by the rains. This is a soil very difficult to cultivate; but it can be made to yield good crops of beans, wheat, and oats.

The land in the New Forest, and on the opposite side of the Southampton Water, is mostly of a light nature, intermixed here and there with heavier loams and clays. It requires careful drainage to make it fertile. The county generally may be said to possess poor soils.

Hampshire, although it cannot be compared with some eastern and northern counties for agricultural improvements, is not far behind them; and there are some farms as well managed as any in England. The farm-buildings and the agricultural implements are gradually improving.

There are no breeds of cattle, horses, or sheep, peculiar to Hampshire, unless we consider the small New Forest ponies in that light. The cows are of various breeds. The oxen are chiefly Sussex and Devon. The horses used in husbandry are mostly bred in other counties. The sheep are—the common small forest breed, or heath-sheep; the Dorset and Leicester sheep, in the richer meadows; and the South-Down, on the chalky hills. The native hogs, which live on the acorns and beech-mast of the New Forest, although the flavour of their flesh may be good, are coarse, raw-boned, flat-sided animals, and are now seldom met with. The improved breeds produced by crosses of the Berkshire, the Suffolk, Essex, and Chinese pigs, are those from which the Hampshire bacon is usually prepared. The excellence of this bacon is mainly due to the care with which the curing is effected.

Divisions and Towns.—Hampshire is divided into 14 divisions, comprehending 39 hundreds. It is included in the diocese of Winchester and province of Canterbury. It is in the western circuit. The assizes are held at Winchester. For parliamentary purposes the county is divided into North Hampshire and South Hampshire, each of which returns two members to parliament, and the Isle of Wight, which returns one; besides which Winchester, Andover, Lymington, Portsmouth, Southampton, and Newport return two members each; and Christchurch and Petersfield return one member each: total, 19 members.

The following are the principal towns, with the population of each in 1841:—

Alresford, a market-town, is situated on the river Itchin, 8 miles W.N.W. from Winchester. It was formerly a more important place than it is at present. Population of the parish, 1578.

Alton, a market-town, 18 miles N.W. from Winchester. There are two breweries in the town, and extensive hop plantations in the neighbourhood. The town contains a national school. The living is a vicarage. The market-day is Saturday. The population is 3139.

Andover, a municipal borough and parliamentary borough, 58 miles from London, by the South-Western Railway. The town contains a church, a union workhouse, two almshouses, and meeting-houses for dissenters. The town-hall is a handsome stone building with a Grecian front. The chief business of the town consists in malting, and in the manufacture of silk. The municipal borough is governed by 4 aldermen, and 12 councillors: population, 4081. The parliamentary borough returns two members. The population is 4997.

Basingstoke, a municipal borough, is 48 miles from London by the South-Western Railway. It has a considerable trade from its standing at the junction of five important roads. The church is a spacious and handsome building. There is a free school, and three charity schools in the town. The malting and corn trades constitute the principal business of the place. Population, 4066.

Bishop's Waltham, a market-town, is 9 miles S.S.E. from Winchester. The principal trade of the place is in leather; and there is also some business in malting. There is an endowed free-school, and several minor charities. Population, 1209.

Christchurch, a parliamentary borough, is 25 miles S. from Salisbury, and 100 miles from London by the railway. It contains a free-grammar school, a national and Lancastrian schools, and several endowed charities. The rivers Stour and Avon flow into Christchurch bay. The borough sends one member to parliament: population, 6634. Population of the town, 1922.

Fareham is 10 miles N.W. from Portsmouth. Some small vessels are built here, and cordage, sacking, and coarse pottery are made. A considerable trade in corn and coal is carried on. Population of the parish, which includes several hamlets, 6168.

Fordingbridge is situated on the N.W. bank of the Avon, 10 miles S. from Salisbury. There are some manufactures of sail-cloth and bed-ticking. Population, 1242.

Havant is situated near the head of Langston Harbour, 7 miles N.E. from Portsmouth. It has little trade. Some of the inhabitants are engaged in fishing and fowling. Population, 1445.

Kingsclere is a small town of mean appearance, 8 miles W.N.W. from Basingstoke. There is some trade in malt carried on. Population of the parish, which includes several tythings, 2732.

Lymington is a parliamentary borough, situated in the New Forest, of which it is regarded as a kind of capital, and where the Forest Courts are held. It is not a market-town. Population, 3818. Population of the parliamentary borough, which returns two members, 4926.

Odiham is 7 miles W. from Basingstoke. The church is a large ancient brick building. Population, 1148.

Portsmouth. [PORTSMOUTH.]

Ringwood is an ancient town, situated in the New Forest, on the eastern bank of the Avon, 16 miles S.W. from Romsey. Population of the town, 2387.

Romsey is situated on the eastern bank of the Test, 15 miles E. by S. from Salisbury, by the Salisbury branch of the London and Southampton Railway. It is a municipal borough, governed by 4 aldermen and 12 councillors. The church is ancient, and formerly belonged to a Benedictine nunnery. It is very large, lofty, and massy, and affords a fine example of Norman architecture. It is at present (1848) undergoing repair. Population of the town, 1919.

Southampton. [SOUTHAMPTON.]

Stockbridge is on the eastern bank of the Test, 9 miles W.N.W. from Winchester. It formerly returned two members to parliament, but was disfranchised by the Reform Act. It is a small place, with a population of 937.

Whitchurch is 8 miles E.N.E. from Andover, on the north-west bank of the river Test. It formerly returned two members to parliament, but was disfranchised by the Reform Act. It is an irregularly built place. Population, 1505.

Winchester. [WINCHESTER.]

History and Antiquities.—Before the Roman invasion, the county was inhabited by three tribes; the Regni (Ρηγνοι, Ptol.), who occupied the coast as well as the counties of Sussex and Surrey; the Belgæ (Βελγαι, Ptol.), who inhabited the middle portion and extended into Wiltshire; and the Atrebates or Atrebatii (Ατρεβατιοι, Ptol.), who occupied, it is probable, the northern part, on the confines of Berkshire. This part of the island was reduced by the Romans under Vespasian. Winchester was the Roman station *Venta*. There are also remains of Roman stations at Silchester, a village on the border of the county, north of Basingstoke; and at Broughton, not far from Stockbridge. The county appears to have been the scene of contest in the Saxon invasion. Hampshire was included in the kingdom of Wessex, and Venta (called Wintanceaster by the Saxons) became the seat of government, and, upon the predominance of the West Saxon kings over the other Saxon potentates, became the metropolis of England. Hampshire was the scene of continual contests during the invasion of the Danes, who ravaged the Isle of Wight in the reign of Ethelred II. The New Forest was the scene of several disasters to the family of William the Conqueror. His son Richard lost his life here, by what Camden describes as a 'pestilential blast;' his grandson Henry, son of Robert, was entangled among some branches and killed while hunting; and his successor William was shot there A.D. 1100.

HAMPSHIRE, NEW. [NEW HAMPSHIRE.]

HAMPSTEAD. [MIDDLESEX.]

HAMSTER (*Cricetus*, Cuv.), a genus of burrowing Rodents, thus characterised by its founder. The Hamsters have nearly the same dentition as the rats, but the tail is short and hairy. On each side of their mouth are extensive sacs or cheek-pouches, which they fill with grain in order to transport it to their deep subterranean retreats. Nocturnal. Hybernate during the depth of winter. Example, the common Hamster (*Cricetus vulgaris*).

Description.—Reddish brown above; black below, with three great whitish spots on the sides. Feet white; a white spot on the throat, and another on the breast. Length about 9 inches;

tail 3. Males bigger than females. Weight of some males from 12 to 16 ounces; weight of females seldom exceeding from 4 to 6.

Hamster (*Cricetus vulgaris*).

Varieties.—Variations in colour are not uncommon. There is one variety entirely black. Pennant figures one which is entirely black, with the exception of the edge of the ear, the muzzle, the under-jaw, and feet.

Localities.—All the north of Europe and Asia (Lesson), Austria, Silesia, and many parts of Germany, Poland, and the Ukraine; all the southern and temperate parts of Russia and Siberia; and even about the river Yenesei, but not farther to the east. In the Tartarian deserts, in sandy soil; they dislike moist places. Swarming in Gotha (Pennant).

Food, Habits, Reproduction.—The common Hamsters are no friends to the farmer. The quantity of grain which they consume is very great, nor does the destruction stop with mere satiety of appetite. The animal never forgets its hoard, and fills its two cheek-pouches till they seem to be bursting with the booty. In summer they feed upon various kinds of herbage; but they are also carnivorous, attacking and devouring rats, mice, birds, reptiles, &c., and even the weaker individuals of their own species. Their voice is a short growl or bark, but when irritated they utter a yelling cry. Their dwellings are under the earth; their mode of forming them, and the purposes to which they apply them, have been thus described. They first form an entrance, burrowing down obliquely. At the end of this passage one perpendicular hole is sunk by the male; the female sinks several. At the end of these they excavate various vaults, some as lodges for themselves and young, some as storehouses for their food. Every young one is said to have its separate apartment, and each sort of grain its different vault. The 'living apartments,' as they may be called, are lined with straw or grass. The vaults are said to be of different depths, according to the age of the constructor; a young hamster, it is stated, makes them scarcely a foot deep, but an old one sinks to the depth of four or five, and the whole 'curtilage,' so to speak, is sometimes eight or ten feet in diameter. From the mode of proceeding in their work, the reader will be prepared for the statement that the male and female live in separate apartments; and indeed it appears that, excepting at the short season of courtship, they have very little or no intercourse. Pennant gives them a very unamiable character. 'The whole race,' writes that zoologist, 'is so malevolent as to constantly reject all society with one another. If it happens that two males meet in search of a female, a battle ensues; the female makes a short attachment to the conqueror, after which the connection ceases. She brings forth two or three times in a year, and produces from sixteen to eighteen at a birth: their growth is very quick, and at about the age of three weeks the old one forces them out of the burrows to take care of themselves. She shows little affection for them; for, if any one digs into the hole, she attempts to save herself by burrowing deeper into the earth, and totally neglects the safety of her brood; on the contrary, if she is attacked in the season of courtship, she defends the male with the utmost fury.'

Siberia produces several small species of Hamster, which have been described by Pallas.

Fossil Hamster.—Professor Kaup records *Cricetus vulgaris fossilis*, from the Epplesheim sand.

HANAPER OFFICE, one of the offices belonging to the court of chancery. Writs relating to the business of the subject, and their returns, were originally kept in a hamper, *in hanaperio;* and the others, relating to matters wherein the Crown was immediately or mediately concerned, were preserved in a little sack or bag, *in parvâ bagâ;* whence the distinction of the Hanaper Office and Petty Bag Office, both of which belong to the Common-Law Court in Chancery.

The business of the clerk of the hanaper is to receive all money due to the king for the seals of charters, patents, commissions, and writs, as well as all fees due to the officers for enrolling and examining them. The clerkship is a sinecure, the holder of which receives 468*l.* a year.

HANAU-MÜNZENBERG. [HESSE-CASSEL.]

HAND-GLASS is a name given by gardeners to a portable glazed cover which they place over certain plants for one of two purposes; either to screen them from the effects of cold and wet without depriving them of much light, or to maintain around them an atmosphere of uniform humidity. Bell-glasses differ from hand-glasses in no respect with regard to the purpose they are intended to serve, but are blown from a single piece of glass instead of being composed of many pieces fastened together. Glasses of this description are principally used to assist cuttings of plants in the process of striking root, or newly planted individuals in establishing themselves in the soil.

HAND-GUN. [ARMS.]

HAND-TREE. [CHEIROSTEMON.]

HANDEL, GEORG FRIEDRICH, was born at Halle, in Saxony, Feb. 24, 1685. His father, a physician, destined him for the profession of the civil law, but the child's passion for music frustrated this plan, and led to his being placed under Friedrich Zachau, organist of the cathedral of Halle. He advanced rapidly under this judicious teacher. In his 14th year he went to Berlin, where he staid some time. In 1703, when about 19, he went to Hamburg, and shortly afterwards became director of the Opera, which involved him in a duel, happily of no serious result, with a jealous rival named Mattheson. He was soon employed

to set a drama entitled 'Almeria,' the success of which was remarkable. Next year he produced 'Florinda,' and 'Nerone' in the year following, both of which were as favourably received as his former work. He now found himself possessed of the means of visiting Italy. At Florence he was welcomed in the most flattering manner by the grand-duke, and there, in 1709, produced the opera of 'Rodrigo.' He then proceeded to Venice, and brought out his 'Agrippina,' in which horns and other wind instruments were first used in Italy as accompaniments to the voice. Handel went next to Rome, where he produced 'Il Trionfo del Tempo,' the text of which was written for him by Cardinal Pamfili, and a sacred opera, a kind of mystery, 'La Resurrezione.'

After visiting Naples, Handel returned to Germany in 1710, and accepted the office of Maestro di Capella to the elector of Hanover, afterwards George I. Having obtained the Elector's permission, he came to England, where he composed his opera of 'Rinaldi,' his 'Te Deum,' and 'Jubilate,' his 'Water Music,' his operas of 'Amadis,' 'Teseo,' and 'Il Pastor Fido,' his 'Acis and Galatea,' 'Esther,' and other minor pieces—all before 1720. When the elector became King of England, Handel received numerous testimonials of royal favour.

The busiest but not the most fortunate period of Handel's life now arrived. The English nobility formed a project for converting the Italian theatre into an Academy of Music, and engaged him as manager, with a condition that he should supply a certain number of operas. His first opera was 'Radamisto,' the success of which was unparalleled. But Bononcini and Ariosti, two rival composers, raised a great feud against him, to calm which, it was proposed that an opera in three acts should be produced, and that each of the contending composers should set one act. The drama chosen was 'Muzio Scevola,' and Handel's portion was declared the best. Handel, now master of the field, produced about fifteen new operas; but his managerial troubles were so great, that he retired from the theatre in 1726, with the loss of 10,000*l.*, and a constitution much damaged by incessant labour and constant turmoil. He then made an attempt to give operas at Covent Garden Theatre, but this proved equally mortifying and unprofitable. He next commenced giving spiritual concerts, or oratorios, at first with very little success, owing to the exertions of a clique or cabal against him. His 'Messiah' was produced in 1741, and 'Samson' in 1742; and from this time the undoubted excellence of his compositions bore down all opposition. The 'Messiah' was, during a long period, performed annually at the Foundling Hospital, and alone added 10,300*l.* to the funds of that institution. He continued his oratorios to nearly the last day of his life, deriving considerable pecuniary advantage from them.

Late in life Handel was afflicted with blindness. He died April 13th, 1759. He was buried in Poet's Corner, Westminster Abbey, where a monument by Roubiliac is erected to his memory. In 1784 a great festival, the 'Commemoration of Handel' (being the centenary of his birthday), was held in the abbey, when nearly 13,000*l.* were received for five days' performances.

Handel was great in every style. In sacred music, especially of the choral kind, he not only throws at an immeasurable distance all who preceded and followed him, but reaches that sublimity which, it is now almost universally admitted, the art is so capable of attaining. Till within the last few years his works were unknown out of the British Isles. Now they are heard with admiration in most parts of Europe. The various choral societies of London are, year by year, making Handel's Oratorios more extensively known than at any former period.

In the Queen's library are the original MSS. of nearly all Handel's works, filling eighty-two large folio volumes. These include 32 Italian operas, 23 oratorios, 8 volumes of anthems, 4 of cantatas, 3 of Te Deums, and a Jubilate, together with concertos, sonatas, &c. Not in the royal collection are 11 operas, harpsichord lessons, fugues, organ concertos, water-music, &c., &c. Of the oratorios 'Deborah' was first performed in 1733; 'Israel in Egypt' in 1738; 'Saul' in 1740; 'Messiah' in 1741; 'Samson' in 1742; 'Judas Maccabæus' 1746; 'Joshua' in 1747; 'Solomon' in 1749; and 'Jephthah' in 1751.

HANDFASTING. [Betrothment.]

HA'NNIBAL, the son of Hamilcar Barcas, was born B.C. 247. At the age of nine he accompanied his father to Spain, who, previous to his departure, made his son swear that he would never be a friend to the Romans. He was at a very early age associated with Hasdrubal, who succeeded his father in the command of the Carthaginian army in that country. On the death of Hasdrubal, B.C. 221, he obtained the undivided command of the army, and quickly conquered many of the Spanish tribes. The inhabitants of Saguntum, alarmed at his success, sent messengers to Rome to inform the Romans of their danger. A Roman embassy was accordingly sent to Hannibal, who was passing the winter at New Carthage, to announce to him that the independence of Saguntum was guaranteed by a treaty between the Carthaginians and Romans (concluded B.C. 226), and that they should consider any injury done to the Saguntines as a declaration of war against themselves. Hannibal paid no regard to this remonstrance.

In B.C. 219 Hannibal took Saguntum, and employed the winter in making preparations for the invasion of Italy, and providing for the security of Africa and Spain. He set out from New Carthage in the spring of B.C. 218, with 80,000 foot and 12,000 horse. Before crossing the Pyrenees he left Hanno to secure his recent conquests with a detachment from his own army of 11,000 men. He sent back the same number of Spanish troops to their own cities, and, with an army now reduced to 50,000 foot and 9000 horse, he advanced to the Rhone. Two Roman armies had been levied; one, commanded by the Consul P. Cornelius Scipio, was intended to oppose Hannibal in Spain, and a second, under the other consul, T. Sempronius, was designed for the invasion of Africa. The departure of Scipio was delayed by a revolt of the Boian and Insubrian Gauls, against whom the army was

sent which had been intended for the invasion of Spain, under the command of one of the prætors. Scipio raised a new army, sailed to the Rhone, and anchored in the eastern mouth of the river. But Hannibal had already crossed the Rhone, and Scipio did not arrive at the place where the Carthaginians had passed the river till three days afterwards. Upon this, he sailed back to Italy with the intention of meeting Hannibal when he should descend from the Alps. Scipio sent his brother Cnæus into Spain with the greater part of the troops to oppose Hasdrubal.

Hannibal continued his march up the Rhone till he came to the Isère. Marching along that river, he crossed the Alps (probably by the Little St. Bernard), descended into the valley of the Dora Baltea, and followed the course of the river till he arrived in the territories of the Insubrian Gauls. The passage of Hannibal across the Alps has been a matter of much dispute.

Hannibal completed his march from New Carthage to Italy in five months, during which he lost a great number of men, especially in his passage over the Alps. His army was reduced to 12,000 Africans, 8000 Spaniards, and 6000 cavalry, when he arrived in the territories of the Insubrian Gauls. His first battle was with P. Cornelius Scipio on the right bank of the river Ticinus (Tesino). The Romans were defeated, and Scipio, retreating along the left bank of the Po, crossed the river, and encamped near Placentia. He afterwards entrenched himself strongly on the right bank of the Trebia, where he waited for the arrival of the army under the Consul T. Sempronius, who had been recalled from Africa. After the union of the two armies Sempronius determined, against the advice of Scipio, to risk another battle. The Romans were entirely defeated, and the troops which survived took refuge in the fortified cities. In consequence of these victories, the whole of Cisalpine Gaul (the northern part of Italy) fell into the hands of Hannibal; and the Gauls of North Italy now eagerly assisted him with men and supplies.

In the following year (B.C. 217) the Romans raised two new armies: one was posted at Arretium, under the Consul Flaminius, and the other at Ariminum, under the other consul, Servilius. In Hannibal's progress through the swamps of the basin of the river Arno, his army suffered much, and he lost the sight of one eye. He marched past Arretium, ravaging the country as he went, with the view of drawing out Flaminius to a battle. Flaminius hastily followed Hannibal, and, being attacked in the basin of the Lake Thrasimenus, was completely defeated by the Carthaginians, who were posted on the mountains which encircled the valley.

To conciliate the Italians, Hannibal dismissed without ransom all the prisoners whom he took in the battle; and, to give them an opportunity of joining his army, he marched slowly along the eastern side of the peninsula, through Umbria and, Picenum, into Apulia; but he did not meet with that co-operation which he appears to have expected.

After the defeat of Flaminius, Q. Fabius Maximus was appointed dictator, and a defensive

system of warfare was adopted by the Romans till the end of the year. In the following year, B.C. 216, the Romans raised an army of 80,000 foot and 6000 horse, which was commanded by the consuls L. Æmilius Paulus and C. Terentius Varro. The Carthaginian army now amounted to 40,000 foot and 10,000 horse. The armies were encamped in the neighbourhood of Cannæ, in Apulia. In the battle which was fought near this place the Romans were defeated with dreadful carnage, and with a loss which, as stated by Polybius, is quite incredible. The Consul L. Æmilius, and the two consuls of the former year, Servilius and Attilius, were also among the slain. Hannibal lost only 4000 Gauls, 1500 Africans and Spaniards, and 200 horse.

This victory placed the whole of Lower Italy in the power of Hannibal. Capua and most of the cities of Campania espoused his cause, but the majority of the Italians continued firm to Rome. The defensive system was now strictly adopted by the Romans, and Hannibal was unable to make any active exertions for the further conquest of Italy till he received a reinforcement of troops. Capua was retaken by the Romans, B.C. 211. Hannibal was therefore obliged to depend upon the Carthaginians for help, and Hasdrubal was ordered to march from Spain to his assistance.

Cnæus Scipio, who had been left in Spain to oppose Hasdrubal, was joined by P. Cornelius Scipio, and the war was carried on with various success for many years, till the Roman army was entirely defeated by Hasdrubal, B.C. 212. Both the Scipios fell in the battle. Hasdrubal was preparing to join his brother, but was prevented by the arrival of young P. Cornelius Scipio in Spain, B.C. 210, who quickly recovered what the Romans had lost. It was not till B.C. 207, when the Carthaginians had lost almost all their dominions in Spain, that Hasdrubal set out to join his brother in Italy. He crossed the Alps and arrived at Placentia before the Romans knew that he had entered Italy. But, before he could effect a junction with Hannibal, he was attacked by the consuls C. Claudius Nero and M. Livius, on the banks of the Metaurus, in Umbria, his army was cut to pieces, and he himself fell in the battle. This misfortune obliged Hannibal to act on the defensive, and from this time till his departure from Italy, B.C. 203, he was confined to the country of the Bruttii; but by his superior military skill he maintained his army without any assistance from home.

After effecting the conquest of Spain, Scipio passed over into Africa (B.C. 204). With the assistance of Massinissa, a Numidian prince, he gained two victories over the Carthaginians, who recalled their great commander from Italy to defend his native state. Hannibal landed at Leptis, and advanced near Zama, five days' journey from Carthage towards the west. Here he was entirely defeated by Scipio, B.C. 202; 20,000 Carthaginians fell in the battle, and an equal number were taken prisoners. The Carthaginians sued for peace; and thus ended the second Punic War, B.C. 201.

After the conclusion of the war Hannibal vigo-

rously applied himself to correct the abuses which existed in the Carthaginian government; but he thus incurred the enmity of many powerful men, who represented to the Romans that he was endeavouring to persuade his countrymen to join Antiochus, king of Syria, in a war against them. A Roman embassy was sent to Carthage to demand the punishment of Hannibal, but he escaped and sailed to Tyre. From Tyre he went to Ephesus to join Antiochus, B.C. 196, and contributed to fix him in his determination to make war against the Romans. But the king only employed him in subordinate command, and he had no opportunity for the exertion of his great military talents. At the conclusion of this war Hannibal went to Prusias, king of Bithynia; and, when a Roman embassy was sent to demand him of Prusias, Hannibal poisoned himself at Nicomedia, in Bithynia, B.C. 183, in the 65th year of his age.

The personal character of Hannibal is only known to us from the events of his public life, and even these have not been commemorated by any historian of his own country; but we cannot read the history of his campaigns, of which we have here presented a mere outline, even in the narrative of his enemies, without admiring his great abilities and courage.

(Polybius, b. iii., which contains the history of Hannibal's campaigns till the battle of Cannæ, and the fragments of b. vii., viii., ix., xiv., xvi.; Livy, xxi.–xxxix.; Appian; Plutarch, *Life of L. Fabius Maximus;* Nepos, *Life of Hannibal.*)

HANNO'S PERIPLUS is a small Greek treatise, entitled 'The Periplus (*i. e.* voyage) of Hanno, king (*i. e.* commander) of the Carthaginians, round the parts of Libya beyond the Pillars of Hercules, which he posted up in the temple of Kronos.' The treatise which we possess appears to be a translation of the Carthaginian document preserved in the temple of Kronos. The time at which this voyage was performed is uncertain; Pliny (*N. H.*, ii. 67) places it in the flourishing period of Carthaginian history.

The object of the expedition is stated at the commencement of the Periplus: 'It was decreed by the Carthaginians that Hanno should sail beyond the Pillars of Hercules, and found Liby-Phœnician cities. He sailed accordingly with 60 ships of 50 oars each, and a body of men and women to the number of 30,000, and provisions and other necessaries.' The first city he founded was Thumiaterion, near the Pillars of Hercules, probably in the neighbourhood of Marmara. The most southern was Kerne. From Kerne the voyage was one of discovery; and after advancing as far south as Sierra Leona or Sherbro, according to Rennell, he was obliged to return through want of provisions.

The Greek text is printed in Hudson's 'Geographiæ veteris Scriptores Græci Minores.' It was also published by Falconer, with an English translation and many notes, 8vo., Lond., 1797. Many remarks upon this voyage are made by Compomanes, 'Antiguedad Maritima de la Republica de Cartago,' Mad. 1756; Bougainville, 'Mémoires de la Académie des Inscriptions,' vols. xxvi., xxviii.; Gosselin, 'Recherches sur la Géographie des Anciens;' Rennell, 'Geography of Herodotus,' vol. ii. p. 409–443, 8vo. ed.; Heeren, 'Researches on the Ancient Nations of Africa,' vol. i. p. 492–501, Engl. Transl.

HANOVER, THE KINGDOM OF, is situated between 51° 20′ and 53° 51′ N. lat., and 6° 51 and 11° 51′ E. long. It is bounded on the N.W by the German Ocean, N. by the Elbe (which separates it from the territories of Hamburg, Denmark, and Mecklenburg), E. and S.E. by Prussia and Brunswick, S.W. by Hesse Cassel, Lippe, and Prussia; and W. by Holland. The area is 14,570 square miles. The Germans write the name *Hannover.*

Divisions.—The kingdom of Hanover is divided into six provinces, called Landdrostei, and one Mining Intendancy (Berghauptmannschaft), the total population being 1,773,711:—

I. *Hanover* (343,184 inhabitants) consists of, 1, the principality of CALENBERG; 2, the county of *Hoya,* chief town Nieuberg; 3, the county of *Diepholz,* chief town Diepholz.

II. HILDESHEIM.

III. LÜNEBURG.

IV. STADE consists of the duchy of BREMEN, the district of *Hadeln,* and the principality of VERDEN.

V. OSNABRÜCK.

VI. AURICH, or the principality of EAST FRIESLAND (174,284 inhabitants).

VII. The Mining Intendancy of CLAUSTHAL.

The *Lower Harz* consists of detached districts on the northern and western declivities of the Harz, lying in the territory of Hanover and Brunswick, and belonging to both in common, Hanover having four-sevenths and Brunswick three-sevenths of the revenue.

Surface and Productions.—The southern provinces of Grubenhagen and Göttingen are mountainous: in the former is the Harz, in the latter the Sollingerwald. Lower ranges, uniting these, traverse the greater part of Hildesheim and Calenberg; but from the cities of Hildesheim, Hanover, and Osnabrück, to the sea-coast, the whole country is one vast plain, with only occasional and not considerable elevations. The mountains abound in mineral wealth, and are covered with forests of red pine and fir, with some oaks and other timber. A broad sandy tract crosses the country from east to west, between the mountains and the sea. The principal rivers are the Elbe, the Weser, and the Ems, which receive in their course numerous secondary streams, as the Aller, Leine, Ilmenau, and Lühe, and empty themselves into the German Ocean. There are only two large lakes; the Steinhudermeer and the Dümersee, which latter abounds in fish. In East Friesland is the subterraneous Lake Jordan, the surface of which it so thickly overgrown with vegetation that waggons can pass over it.

Agriculture is the chief source of subsistence to the inhabitants, which is much favoured by the facilities for exportation when the harvest is abundant, as well as by the transit trade, and the consumption of the neighbouring maritime towns, In the marsh-land the breeding of cattle is more followed than agriculture. The country products flax, tobacco, hops, fruit, pulse, potatoes, &c.

R.B.A.N.M.S.H.S (M) LIBRARY
Blore-42
Accession No; 723
U.D.C No: 030-1/ROU
Date; 4-2-81 1960

R. B. A. N. M'S
High School (Main) Library

BOOK CARD

Author ROUTELEDGE.

Title THE National cyclopaedia of useful knowledge Vol 6.

Acc[illegible] No. 723

Class No 030.1 (ROU) 1960

me of the Borrower	Card No.	Due Date